

SOLDIER

The
Autobiography of
Bailey K. Ashford
and his Fight against
Tropical Disease

IN
SCIENCE

SOLDIER IN SCIENCE

Thirty-five years ago an obscure Army doctor, Bailey K. Ashford, discovered hookworm in Puerto Rico. To-day, after a brilliant career as scientist and physician over three continents, Dr Ashford is internationally recognized as one of the great figures of our time.

The pattern of his life is as vivid and dramatic as an exciting novel, and he tells his story with enormous gusto. Born in Virginia, he went into the American Army and was sent to Puerto Rico during the Spanish War. There began his tremendous interest in hookworm victims. The first years were difficult. But his patients had implicit faith, even if some of the medical profession scoffed. So, at that hot and primitive clinic in the tropics, thousands of men, women, and children were treated, and recovered

(continued on other flap



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A SOLDIER IN SCIENCE

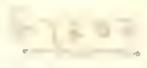


BAILEY K. ASHFORD

From a bust by Marjorie Daingerfield Holmes

Harwood Hull Photograph

front



A Soldier in Science

The Autobiography of
BAILEY K. ASHFORD

LONDON:
GEORGE ROUTLEDGE & SONS, LTD.
BROADWAY HOUSE, 68-74 CARTER LANE, E.C.4

1934

B219 A.1.1



Made and Printed in Great Britain by
PERCY LUND, HUMPHRIES & CO. LTD.
12 Bedford Square, London, W.C.1
and at Bradford

Contents

	PAGE
FOREWORD	V
PART ONE	
ARMS AND THE MICROSCOPE	I
PART TWO	
THE SECOND CAMPAIGN	65
PART THREE	
RECONNAISSANCE OF BRAZIL	129
PART FOUR	
THE BUCCANEERS OF LANGRES: 1917-1918	191
PART FIVE	
NO TRUCE IN THE TROPICS	321
PART SIX	
AUTHOR'S NOTE	415
PART SEVEN	
INDEX	419

Illustrations

BAILEY K. ASHFORD	<i>Frontispiece</i>
From a bust by Marjorie Daingerfield	
UTUADO ANÆMIA CAMP, 1904	68
DR. ASHFORD TAKING A BLOOD SPECIMEN	100
PROFESSOR ASHFORD IN HIS LABORATORY	340



PART ONE
ARMS AND THE MICROSCOPE



Chapter I

I

IT WAS a stewing hot afternoon in the Caribbean, with the sun pouring into a stuffy bare room six feet by ten; yet still he sat with his eye glued to a portable army microscope.

He had been sitting there since early morning. In fact, he had sat there most of the time since the hurricane, which had driven hordes of pallid refugees from their mountain homes to seek food and shelter in the city. Their pallor was not brought on, however, by a hurricane only three months past; it was the pallor of years, of centuries. It was the seal of a disease no one ever had deciphered. But of that disease they died—had for years been dying—until now, when asked of what they had lost father, mother, and other kin, they answered: “*De la anæmia—la muerte natural.*” (Of anæmia—natural death.)

He had begun nonchalantly, even confidently, with the blood. But no known cause of anæmia was to be found there. Only a tremendously interesting, fantastic blood picture. Appetite whetted, he finally began to wonder if that anæmia might be caused by something else, something outside the blood. Certain interlopers did this sort of thing to blood sometimes, though not so energetically. And so this afternoon, his research directed hither by his many days of examining blood, he was staring at a thin film of fæces crushed between cover-glass and glass slide. It was his first look at the fæces.

A SOLDIER IN SCIENCE

What was this oval thing with the four fluffy gray balls inside? This had no business here. It was undoubtedly an egg. An egg of what? Probably of a worm. Feverishly, he reached for his Manson's "Tropical Diseases," ransacked its pages. There, in an out-of-the-way corner, was a cut of an egg exactly like the one under his eye. It was the egg of *Ancylostomum duodenale*, a parasite found in certain anæmic Italians who had worked on the St. Gotthard tunnel in Switzerland.

Anæmia, with a curious blood picture, an egg of a worm with a long strange Latin name, anæmia. . . . *Anæmia!* That was what these people were dying of. But the egg! He resolved then and there to see the worm that had laid that egg. Thymol, he read, would expel the worm; but some said that only too often thymol was a deadly poison to the patient. He took one more look at the cut in the book, still another at the egg under the microscope. Then he arose, ordered his ambulance-of-all-work to take him to town, and hurriedly left the stuffy little room where so much had happened since early morning.

His mind was definitely made up: the anæmia of miners in Switzerland was the anæmia from which millions had suffered and died in Puerto Rico. He began to think geographically. Of course he must be very prudent, but—the anæmia pandemic in Puerto Rico could not be limited to this one little island. It was all through these latitudes. It must be. He had heard of the indolence of Mexicans, of Central Americans, of people everywhere in the old Spanish Main. He could not *say* that their indolence was caused by disease. Secretly, however, he knew now that it was, though he couldn't say so—yet. But he *could* say so for Puerto Rico, for our war ward, so newly under our Flag, and so sick.

In passing his field hospital for indigent anæmics, refu-

gees from the hurricane of San Ciriaco, he picked up the depositor of that egg. He looked at the expressionless face of his *jíbaro* (peasant) and fairly beamed. Here was the prototype of anæmic millions all over the Caribbean, all round the tropical belt that girdles the portly belly of Mother Earth. That *jíbaro* was becoming positively beautiful to the young doctor. He would take him to town, get the local photographer to immortalize him.

He passed a telegraph office on the way. "Whoa! I almost forgot, Flugel. I've got to send a telegram." And into the office he dashed and scrawled the following:

PONCE, NOVEMBER 24, 1899

CHIEF SURGEON, SAN JUAN:

HAVE THIS DAY PROVEN THE CAUSE OF MANY
PERNICKY, PROGRESSIVE ANÆMIAS OF THIS
ISLAND TO BE DUE TO ANCYLOSTOMUM DUODENALE.

ASHFORD.

Now to the photographer. The *jíbaro* underwent this operation perfectly. Then, as an afterthought, to the sedate mansion of Ponce's leading physician, a very wise man. He rang the bell. When the door was opened, he caught sight of the gray-haired physician away back in his *sanctum sanctorum*. But no place was sacred any longer to this young man. In he strode and announced: "Dr. V——, I have just discovered the cause of the anæmia of our *jíbaros*. It's a worm! Not climate, nor food, nor bad hygiene, nor malaria, nor anything of that sort, but a worm—an intestinal worm!"

The doctor was impressed—not by the news, but by the visit and the surcharged excitement of the visitor. He laid aside glasses and smiled—he was a kindly man—and, at the first pause, gently remarked: "You know, doctor, this is a very trying climate on you Northerners. . . ."

"Father, tell me a war story."

"Do you know how we made a regiment of Yankee infantry run at Antietam with only a couple of dozen pine logs? We knew we were to be attacked by a superior force, and we only had ammunition enough for a few rounds from our six field pieces. So we cut some pine logs and mounted them to look like cannon. When the Yanks made their first rush, we gave a yell and let drive from the flank with our six real ones. They took one look at the pine-log batteries that were ready to open up the next minute, concluded that they had been misinformed, and turned tail." And then the hearty Virginia laugh. That was my dad's only war story.

"But mother says you were wounded in the throat, were captured, and escaped. All the other boys' fathers tell lots of war stories. Why can't you?" complained the small boy, deeply chagrined.

My father, a handsome, bearded, dark-haired man with fine friendly gray eyes, replied with just the suspicion of a smile lurking in the corners of his mouth: "Bailey, when a gentleman is licked in a fair fight, he should have no more to say. Better to remember only that we fought for what we thought was right. The thing for you to be thinking of now is that we're just one great people."

It may seem strange that I remember him, for he died in '83 when I was not quite ten years old. But, although not talkative, he had a powerful and attractive personality. This brought him tremendous popularity and a large clientele. He was what doctors were in those days—both physician and surgeon, but it was his great skill in surgery that filled his offices and prompted Tulane University to offer him the professorial chair in that specialty. He was al-

ready Professor of Surgery in Georgetown—at that time a much less widely known institution than Tulane. However, my father was not the man to desert his associates for a higher salary or a greater display of position, and so he declined the new honour. Later he rose to be Dean of the Medical School at Georgetown.

When Garfield was shot, he was called in—quite too late. It has always been my belief that had he and Agnew been given a free hand, the pitiful death of one martyred President might have been avoided. However, this is merely the faith of a devoted son that speaks.

Those offices of his had an irresistible fascination for me. Father said I was too serious for a child, because I sought my companions among older people. I must have been an odd little figure, flitting in and out of those crowded waiting-rooms and talking with any whom I could engage in conversation. My French tutor complained of my interloping, but my father never stopped the yarns I spun out of my head for his patients. In fact, he used to take me with him in his sleigh in winter to the Children's Hospital, where he was surgeon-in-chief, and with the early history and administration of which he was intimately associated; and he even took me to see his patients when he made his rounds to their homes. Once we were lost together in the West Virginia mountains, and I became fearfully thirsty, and no water anywhere. Then I found out that my father really loved me. He carried me and, thirsty himself, told me stories.

He used to refer to me, laughingly, as his chatter-box. I didn't like this mild epithet, until I found that he seemed rather to approve of what it stood for. But still I wished that he wouldn't think I was a chatter-box—it didn't sound dignified enough for one who considered himself quite grown-up.

His death at only forty-one years of age was a fearful shock. At my grandmother's, where I had been taken in order to leave our home as quiet as possible, they woke me up in the night—I had been dreaming that he was dying—and told me. It had never before entered my head that so strong, wise, and beloved a man could die.

His death did two things to me: first, I definitely decided that prayers were not answered and that Dr. Sunderland, our pastor, was wrong in supposing that God was merciful; and second, I resolved that, come what might, I would be a Doctor of Medicine.

3

When my father died, leaving five children and sweet inexperienced mother, we went to live with my grandfather, Moses Kelly. Then, too, came the end of my private schooling, the dismissal of my tutor, an emotional Frenchman, graduate of the Sorbonne, and a heaving of me into the public schools of Washington, which, fortunately, were excellent.

Thereafter, my mother took full charge of us children, three of us eventually becoming physicians and entering the United States Services. The most ingenuous and lovable of women, she trusted everybody, even me. But—what was for me a terrible failing—she was extremely religious. For mother's family tradition, though tempered by a keen wit and a strange gentleness of character, was a tradition of essential puritanism.

Her father's people had come originally from the small parish of Kelleigh in Devonshire, "whose members," says Burke, "might look back beyond the Conquest, and derived themselves from the ancient Britons." John Kelly, founder of the American branch of the family, settled in Newbury, Massachusetts, in 1635. They got up to 1783 successfully,

without making preachers out of themselves. Then came the first Reverend, from whose son, Abner Bailey Kelly, I received my name. He died the year before I was born. It was a strange mood of Fate that made a southern city like Washington a romantic Mecca for that New England great-grandfather of mine. The go-between was my grandmother, Mary Walker, from a Maryland family which also smelled strongly of the Old Testament. In his correspondence with her, before she married his son Moses, great-grandfather Abner Bailey sent her reams of holy thoughts about sweet Sabbaths, Sunday-school episodes, and revered pastors of the early Washington which he had visited. But he had humour too, and once remarked: "If it were not for the superiority of my handwriting, the unrivaled elegance of my learned letters would be greatly obscured, if not totally lost. Good penmanship is like a fair face—it is an ornament even to the point of folly."

Abner Bailey's son Moses was an exceptional man. He was a New Hampshire Democrat and a sympathizer with the South. In Washington he amassed a fortune, and for part of President Buchanan's administration, he was Secretary of the Interior. But he had lost everything save his home and his good name in the Jay Cooke disaster of 1873, the year of my birth. Now he was a worried old man, living in what seemed a palace, but without the money to keep up expensive tastes acquired earlier in life. He and his family had reached a state of cloistered dignity. They never bowed their heads. They were never poor: they simply were no longer rich. But there was not a family more respected nor more upright in that mushroom capital, with its lingering characteristics of a village.

This Puritan strain was, of course, diluted in my generation by the blood of the Ashfords. We do not yet know

in what year my great-great-grandfather, Michel Ashford, came over, also from Devonshire; but his was the first will reported in Prince William County, Virginia. In 1732 he was a member of the first Vestry of both Pohick and Fall's Church in Fairfax County. His will shows the family to have been one of substantial fortune. He was a neighbour and friend of George Washington, as was his son Francis. They are both mentioned in Washington's memoirs. Three of my great-uncles were soldiers in the American Revolution.

But as I have remarked, the full force of my mother's religious tradition was oppressive to a boy of ten and upwards. I could not go to parties and dance. Cards were just so many passes to the furnace of lost souls. Girls were *verboten*; and the society of swearing male infants of my own age was an ever-present danger.

On Sunday, I was dressed in a starched shirt and sent to the Sunday School of the First Presbyterian Church at eight-thirty a.m. At eleven I was herded into the family pew, there to sit squirming for an hour and a half, under Dr. Sunderland's thundering denunciations of Robert Ingersoll and his approbation of John Calvin—whom I secretly hated, having got wind of his views on infant damnation. Nor was this all of my earthly paradise. I often had to attend Missionary Society meeting, held at four p.m. And on Thursday evening there would be prayer-meeting, with Brother Dalrymple offering a short prayer half an hour long and talking to God as one business man to another.

Naturally, the more Dr. Sunderland scolded and roared at Bob Ingersoll, at card playing, dancing, wine, and the Devil and his angels, the more I felt drawn to them and the more human and agreeable they seemed; especially the angels. For, being the Devil's, they must all have been pretty

girls, and a hand-picked devil-angel girl seemed more attractive than a doll with a harp. Besides, the Devil was said to be always a perfect gentleman; and to be a gentleman was at that period my highest ambition.

From seven to nine on balmy summer evenings, I was allowed to sit out on the steps and entertain some little friends from the neighbourhood. All were males, scions of good families, and were carefully selected by my superiors. But occasionally a merchant's son would creep into the charmed circle. Then mother felt it her duty to let me know that people who ran a store were often quite common, and not very good company for me. One evening was banned—Thursday. If I couldn't go to prayer-meeting on Thursday, I had to wrestle with the Lord and my spelling-book indoors.

Happily, all this was changed after I had scarlet fever and nearly died of middle-ear disease. Things got easier, and I hoped it was because mother had made a few concessions to the Devil, so that he wouldn't try to stop God from saving my life. Of course, I never dared broach the question.

I have laid particular stress on all these religious influences, because they really had an important bearing on my after-life, and more especially on my development as a young man.

4

Day by day, year by year, as the youthful Bailey K. climbed, at times quite painfully, up the public-school ladder, he became more and more curious about the world beyond the smug community of Washington. There came over him a powerful itching to know more than the history of Moses, David, Jonah, and other Biblical worthies. Forbidden the emotional excitement of the theatre, he made

his ingenuous way into a well-accepted circle of respectable officers' families at the Marine Barracks. Of them his unsuspecting guardians approved; but they had, Bailey well knew, a hankering after the fleshpots of the world.

One night, to the horror of his elders, he emerged at a social gathering as an adolescent actor in a prosy Christmas play full of dramatic situations. To make matters worse, he was aided in this sinfulness by a female—a mere wisp of a girl, for whom he had formed a violently Platonic attachment. This amused his jolly old great-uncle, David Walker—also an unwilling victim of the decalogue—who took him incontinently to the circus. Bailey K. was thus lodged safely in the lowest pit of perdition and became the subject of the family evening prayers.

Moreover, in his second year of high school, he managed to elude the watchfulness of his trusting mother, who had kept him out of the military during his first year, and inscribed himself among the High School Cadets. He learned to be assiduous in improving his personal appearance and to bid for the attention of female onlookers, admiring schoolmates. He agreed with the wisp of a girl that a military man was a mighty big man. It was certainly so at the barracks. Besides, a military man was privileged to wear a uniform. Mere male civilians were not impressed by those uniforms, but female civilians appeared to make no particular effort to avoid sight of them. Also, there was the matter of authority. An officer never had to ask for anything as a favour. An officer commanded.

Now, although Bailey K. had always been taught to be polite, he did not relish asking anything from anybody. An officer was a man who just ordered what he wanted. He was polite about it; but Bailey K. shuddered to think what might happen to the wretch that would dare to reply, "I will not." Bailey K.'s people had always taught him

that nobody in the world was better than anybody else, that everybody had equal rights; but he never had believed it, and he knew enough to realize that they did not believe it any more than he did.

The real objective, then, was to get where the right to order was recognized; and so, after the interval necessary for the development of a new furrow in his plastic gray matter, he observed to the wisp of a girl: "I should like to be an officer."

The answer was direct and convincing: "All you will have to do is to study hard."

Yes, decidedly, this was reasonable. He had never really understood before what that prosy phrase "knowledge is power" meant. He realized now that the government of the freest country on earth had given certain men the power to command, because those men knew more than the rank and file.

That settled it for Bailey K. He would be an officer, and he would study hard. And so those twin ideas were born. In his last year of school he was a first sergeant—the highest grade he could attain, after having joined the Corps a year late. Just before commencement he paraded with his battalion and received the score of "The High School Cadet's March" from John Philip Sousa's own sacred hand.

By this time the eldest of the young Ashfords was a fairly normal youth. He no longer allowed the piety of his family to get in the way of a good time; but mainly he studied. He went to college, now George Washington University, and sat at the feet of various professors—mostly aged Baptist ministers, it is true, but stuffed with knowledge, and with considerable intellectual garbage also. There he entered upon his seventh year of expurgated

Latin; and a white-haired old replica of what Pericles used to look like taught him his second year of Greek.

At this point in his career, the blue-eyed mother with the lovely voice, who had used to sing a bad-tempered and squalling Bailey K. to sleep many years before, insisted that he should learn to play some musical instrument. "It will be a comfort to him some day," said she.

So Bailey K. was taught violin music by a violent old German professor, who snorted his contempt for "dose souns of shoy valses" and inundated the boy with harmony, thorough bass, and Beethoven. Bailey K., who was routed out of bed at five-thirty to practice his two hours a day, soon acquired sufficient skill to degrade his classical education in music by scraping execrable marches and tomcat college romances at the Glee and Banjo Club. The club was gleeful enough, and it did boast of one man who played the banjo. The rest played whatever instrument they knew, until they should learn to play the banjo—which none of them ever did. They even let in one fellow who could only whistle; but he was a real fellow. It was later in life that Ashford developed a classical sense for music, of which he has never been ashamed; for next to deeds, music is the finest expression of thought.

Meanwhile, Bailey K. had joined a college secret society. The secrets consisted mainly in developing the art of flaunting Baptist rules and regulations. Abetted by a certain Mr. Remey, who stuttered, a Mr. John A. T. Hull, son of a Representative from Iowa and later Judge-Advocate General of the Army, and one other, a fat boy who later continued to be just what he had been in college, Bailey K. nearly wrecked the fraternity by stealing an Egyptian mummy from the university museum. They dressed it in student's cap and gown and ran it out on the telegraph wire connecting the college with St. Patrick's Church,

where they left it swinging, to the horror of early morning worshipers at Sunday Mass, and to the loud despair of Hook and Ladder Squad No. 17.

But the virus of study, of getting ahead in the world, first introduced into the boy's system at that dance back in the Commanding Officer's old colonial quarters at the barracks, was not seriously attenuated by music, by girls, or by "college life." Fortunately boys didn't drink much in those days, nor did parents allow their daughters to float around after dark. Bailey K. was able to remain fairly studious and idealistic, and he suddenly became restless at George Washington, where, thanks to a good high-school training, he had made two years in one. Abruptly, he left college and entered the Medical School of Georgetown University, thus making good his determination to follow his father, his ever-present ideal.

For an inquisitive youth demanding the reason of things, medicine was singularly hard in those days, no matter where studied. There was much teaching of half-truths, much unconvincing argument, much stuffing of heads with intellectual refuse, and, above all, too much "clinical eye." Then, too, medical schools were made as uncomfortable as possible for the poor student. Dissecting rooms were icy cold, lecture halls dimly lit, distances far without proper means of transportation, and, in this particular school, lectures were held at night. The doctors were too busy practicing medicine to lecture in the daytime. Furthermore, government clerks with a prying appetite for medical wisdom found in this profession a feasible escape from bureaucratic slavery, and, since they formed the majority of the student body at Georgetown and the Government took their daylight hours, the Medical School had to conform its schedule to their convenience.

Young Ashford stumbled so often, while trying to fol-

low in his father's footsteps, that he became fearfully discouraged, wondered if he would ever be able to make a living at all. Nevertheless, he kept on—all the hot Washington summer cramming anatomy from bleached bones and from papier-mâché models in the Army Medical Museum; all the winter scrabbling for time to attend lectures and prepare for quizzes. In the last year, in addition to this, he was Assistant Resident Physician in the Children's Hospital, which his father had helped to found. This practical experience was jumbled all in together with the hopelessly disjointed bulk of his encyclopedic knowledge. Still he kept on.

But one day he passed. Another day, graduation in cap and gown. Another year, Resident Physician of the Children's Hospital. And, for part of the year following, he was the physician in charge of the old Home for Incurables in Georgetown, where the last of General Washington's close relatives, Mary Ball, over a hundred years of age, passed peacefully away in his arms.

But there was still another day to come—a winter afternoon in the musty study of the venerated George M. Kober, one of Washington's famous medical scientists. Dr. Kober, Prussian by birth, violently American by choice, immensely wealthy through one of those queer tricks of fortune, had once been a medical student under young Dr. Ashford's father. The following conversation took place:

“Dr. Kober, you have always represented my father since his death, and now I am worried and want your advice. I have graduated in medicine, but I can't bear to make a business out of it. I want to lead a life of investigation, but I have no money. How am I going to live and do it?”

“Vell,” he lisped, “der iss but von vay. Go into ze

Army. Dey'll alvays pay your salary und you vill haf a retired pay to ze end, ven you reach sixty-four. Dis iss ze only sure ding."

5

He was right. This idea, this passion for a military career, had been stowed away back there in my brain, ever since it was born amid the blare of the Marine Band long ago. Even then, of course, it sprang from no mere vanity to wear a uniform. Like most boys with imagination, I enjoyed dramatizing my life a little; but I was no vain fool. It was not the pay that drew me now, either—dependent though my poor mother was. It was—well, it was a feeling that the most reputable thing a man could do was to use what he had learned for the benefit of his country. And besides, men of the Army were generally honest and fearless.

That is why I went into the military service.

Through the intervention of Walter Reed, Major in the Medical Corps and new-found friend, I served, during a short period of silent study and dreams, as acting Assistant Surgeon for a battery of artillery stationed at old Fort Washington. There, on the brow of the Potomac, opposite peaceful Mt. Vernon and the home of my forefathers nearby, and to the muffled sound of pulsating, flat-bottomed river steamers, I prepared for my entrance examination.

And then the final day dawned. It lasted exactly thirty years.

In 1897, there were nine vacancies in the U. S. Army Medical Corps—and about one hundred and forty applicants to fill them. Our Board contained several famous men. A real character, General Forwood, a surgeon and veteran of some trying Indian campaigns, was President. General Leonard Wood, then a Captain in the Medical

Corps, was Recorder. Major Walter Reed, now immortal for having liberated the world from yellow fever, was one of the members. They gave us a terrible week's grilling. The candidate who failed in any subject was haled before the Board at the close of that session and told that he need not return the next morning. That first day the number fell off like the leaves of a maple tree at the onset of frost.

On Thursday I went to Wood—he was nearest my own age, and very human—and told him that it was my intention to drop out that day, myself; that I knew I had failed, and preferred to die by my own hand, as it were. I never had seen such a look of astonishment in anybody's face.

"Why," he said, "you're clean daffy. I'm not supposed to tell you, but so far you're at the head of the class. You come with me to the football game this afternoon."

I told him that I had to study for the next day.

He said: "No, you're not going to do any such thing!" And he dragged me off to the game, where we lay on our stomachs on the greensward and began a warm friendship that lasted through life.

At the end of the week, six of us were commissioned first lieutenants on the spot, and were admitted to the Army Medical School. The three other vacancies could not be filled.

I had found myself tied for first place with a short friend of mine, Henry Page, son of a famous "judge" in Princess Anne County on the eastern sho' of Maryland. Page was possessor of a merry disposition and an irrepressible spirit of indiscipline. We two young chaps were so fed up with study, after our intense work to pass the entrance examination, that we decided to do as little as need be at the School, and to gambol a bit—since we were officers now, and could not decently be fired. We must have done pretty well at gamboling, too; for I regret to record that when graduation

day came, the faculty tied me with the same merry individual for last place.

One night, when we two had stolen off without permission to attend an especially sumptuous ball in Baltimore, the bell rang for us.

War had been declared! War on Spain!

Chapter II

I

THERE was an instantaneous improvised commencement the next day, and, to our complete disgust, Page and I were ordered to peaceful posts *in time of war!* We had been gathering that we were the only hope of the Republic; yet here we were bundled off out of harm's way, one to freeze in some place in the far northwest, the other to fry in Texas. Cherishing the hope that in some way Mexico might be booted into defending her poor old mother Spain, I left for San Antonio. But no sooner had I started than my orders were changed for Fort St. Philip, Louisiana.

This "fort" was a part of the levee down in the ooze of the Mississippi Delta, nearly a hundred miles below New Orleans, and was said to be the most unhealthy post in the United States for a garrison. In ancient days, between General Jackson and the British, the stronghold had been pretty efficiently wiped off the landscape. Fort St. Philip was now a mere pimple in an expanse of swamp, and had one ramshackle wooden house for quarters. In this war, Congress had decided to refortify it with the huge new disappearing guns invented by General Crozier.

This seemed more promising than Texas, if not very glorious. But three months of roosting on a levee without a tree for shade left us completely disillusioned. Moreover, there were swarms of out-size mosquitoes, which necessitated the wearing at all times of heavy clothing,

buckskin gloves, boots, and a net draped over the sombrero and tied with a purse-string around the neck. The solitary house had only four rooms, all on the ground floor. Nevertheless, it had to serve as Headquarters, adjutant's office, quartermaster's storehouse, dispensary for the sick, and commanding officer's and surgeon's quarters. There was also a kitchen, dining-room, and a post canteen where untold barrels of Budweiser furnished the only thrill to be had at Fort St. Philip.

The Commanding Officer, destined one day to lead one of America's great armies in France, was Hunter Liggett, then a Captain in the 5th Infantry. Hunter Liggett was a real soldier. He took one look at the company of artillery, already encamped in tents and rapidly being devoured by mosquitoes. Then he spent his company-fund savings in raising, to accommodate his own infantry company, a structure which his men promptly labelled "The Cage." It was nothing more than a frame like a large chicken-coop, over which was tacked wire screening. The two-by-fours supported shelves inside for sleeping bunks, and there was a tarpaulin roof. The infantrymen bought red paint and hung up signs labelling various sectors of their cage LIONS, TIGERS, SNAKES, and so on; and therein they slept the sleep of the just, reviling the artillery from behind bars, so to speak. These men deeply loved Hunter Liggett, and he not only knew what each and every one was capable of doing, but also on what days they could be depended upon to get drunk or to malinger.

Italians worked on the emplacements on our side of the river, and negroes at Fort Jackson on the opposite bank. There other disappearing-gun emplacements were being laid, and there, as at Fort St. Philip, they seemed likely to disappear altogether into the slime of the Delta, because of

the hundreds of tons of cement required to secure a stable firing-base.

One of our amusements was to invite the negro labourers, about two hundred in number, to visit us and sing in the moonlight. Their chief "tenah" was their leader. He was what they described as a "long-haired niggah," short and pop-eyed, with enormous lips. When arrayed for the occasion in cutaway coat (once black), pants with wide ultramarine stripes alternating with white, a white ves', "yaller" shoes, a painful red tie with an enormous dollar-and-ten-cent diamond pin, and a long black "seegar," he needed no spotlight to set him off.

Their star effort was, "Mistah Johnsing, turn me loose, I'se got no money but a good excuse. Aw, Mistah Johnsing, turn me loose!" This, had Hunter Liggett been an older man, would have ended his days then and there from apoplexy. Never since have I heard negro songs such as those to which we listened down in that lonely Delta district—songs unwritten, unwritten humour, unwritten pathos. Crooned long ago in the jasmine-laden air down on the Mississippi, they probably have disappeared forever, along with the gun-bases in the ooze.

2

Hunter Liggett was as anxious to get to the scene of war as was his lone Medical Officer; and one day he gleefully announced that he had "worked it," and that I should go, too. He was ordered to Cuba, I to join General Nelson A. Miles' expedition to Puerto Rico. We left the company almost weeping at the edge of the levee.

My military order blew out of the car window on the way over to Tampa, where, as soon as I arrived, I reported to the Chief Surgeon of the expedition, General (then

Colonel) O'Reilly. He marched me straight to the Commanding General's office, which was in a shanty. On the way, I noted that the enormous sprawled-out camp at the port of embarkation was teeming with flies, and that the hastily constructed latrines were shallow and brimful.

The General commanding was a fiery Irishman, and my introduction to him was anything but pleasant. "General, here's a young man who says he's a Medical Officer of the Army without any order. I think he's a doctor, and if you want him, please send him somewhere and get him out of my way."

The General snorted, wrote out an order, and said: "Take this to General Schwann who is on the point of leaving to take command of the provisional brigade of regular troops for the invasion of Puerto Rico."

I reached the water's edge too late. General Schwann, the last to join the ship, had just left, and there he was in a small boat about a hundred yards off-shore. But I was so wild to go that I completely forgot myself and waved peremptorily for him to come back. They told me afterward that the General thought I was a special messenger with important despatches. When they found out the truth, I was roundly cursed, piously by the General, and meticulously by all of his aides, one by one.

Strangely enough, on our boat they seemed to have no knowledge of the battle of Santiago. We took all precaution against Cervera's fleet, sailed round the western point of Cuba, and only knew what had happened to Cervera when we saw the smoking wreck of the Spanish cruiser *Oquendo*. Our original orders were to land at Fajardo on the east coast of Puerto Rico, but we were met by the despatch ship *Dixie* and told through a megaphone to go to Guánica and be damned quick about it.

At Guánica, the first troops that were landed exchanged

a few shots with the retiring Spanish forces. Then all were disembarked—except myself and some four hundred cases of typhoid fever under my charge, which had developed en route from Tampa, and which it had taxed my ingenuity to feed. In fact, the only way I was able to do it was by taking away all the officers' condensed milk supply.

We sailed for Ponce, where the hospital ship *Relief* promptly took over all of my sick, and I landed and hustled up to get an order to join my command at Yauco. I'll never forget the Playa of Ponce, the harbour filled with transports in two long lines, and ashore orderlies galloping about and batteries of light artillery taking sharp corners at the trot in clouds of dust. I set out that afternoon on a dinky little train, which wended its jerky way through rich tropical lowlands overhung with the high walls of green mountains, and which brought me to my command just as they were bivouacking.

Next morning we turned to the westward. It was now for the first time confided to me that our objective was Mayagüez, and that we were expecting momentarily to meet the enemy in equal number at some point along the road. We formed the left wing of the American Army and were part of an enveloping attack, which, when it had proceeded a certain distance, was to be followed by a frontal attack on the Aibonito Pass by the main body under General Miles. At San Germán I found an excellent Red Cross Hospital all prepared, and there I left some cases of typhoid fever which had developed during the tiresome hot march.

A few miles out of San Germán there came an unusually long halt, and we heard shots. I rode ahead to join General Schwann, and found him in a pretty exposed position. He was watching McComb's troop of cavalry double up the left flank of the Spanish forces at Hormigueros, supported

by a frontal infantry attack. The firing was at so great a range, at least for the Spaniards, that only a few stray shots reached us. But a man on horseback near me suddenly threw up one hand and toppled back.

It was my first war wound to treat. The bullet had snipped the facial artery, and there he was bleeding like a fountain. I had nothing to work with, except a pair of suspenders with one of those old-fashioned grips that we used to use to hold up our drawers. I cut the grip off, applied it as a forceps to stop the bleeding, and sent the man to the rear. Then General Schwann's Chief-of-Staff fell from his horse with a bullet wound through the ankle. The Chief Surgeon now ordered me back to open up our field hospital in a large sugar mill in sight of Hormigueros. But, before leaving, I saw that our infantry was making advances in short rushes of platoons toward the Spanish lines on the crest of a hill not over four hundred yards away, and that our cavalry was having a lively time somewhere beyond the hill. What they really were doing was to charge a moving train full of Spanish soldiers retiring on Mayagüez. The field artillery was unlimbering its guns just as I left.

Little by little we commenced to get in the wounded, among them an old negro civilian shot fatally in the belly. I had noticed that the highway up near the front was filled with stolid peasants, on their way to town. Although right in the midst of a battle, they probably felt that, as it was no concern of theirs, nothing could happen to them. This negro was one of the victims, but he died like a hero. The interpreter told me afterward that he said: "I never thought I was to have the honour of dying under the American Flag."

When things began to get slack in the hospital, I left one of my assistant surgeons in charge and again went forward.

I met Lieutenant McAndrews of the Medical Corps, who was bringing in a Spanish lieutenant wounded through the thigh and carried by four Spanish hospital-corps men with faces as expressionless as those carved on the Assyrian temples. Lieutenant Vera, who spoke a little English, explained that when he was hit, and saw that his company was about to be sacrificed, he commanded his men to join the main Spanish body, grabbed these four bearers whose Medical Officer was nowhere to be seen, and commanded them to remain with him until he was taken in by the Americans.

"They did not seem inclined to accept my kind invitation," he said, "but I covered them with my revolvers, and that is why they are here."

To my consternation, I found that our brigade had pushed on to Mayagüez and left me without orders. In all, we had ten Spanish and sixteen American wounded, besides the inevitable daily crop of typhoids. We spent the night moving about from man to man and finally, in the early morning, received orders to come in with our wounded. The ambulances were filled to overflowing, and my horse had been shot in the foreleg, so we did not get in very rapidly.

In Mayagüez we left our casualties to the care of the Red Cross Society in the Municipal Theatre, where about fifty Spaniards were already collected; and I made my way as best I could in the dark to my command on a hill overlooking the city. In getting through the picket lines, I was fired on at short range by a galoot of a recruit, because I did not know the password. When he found that he nearly had killed an officer, he stammered, in a manner which tried to appear nonchalant: "I beg your pardon, sir. I thought you was a cow."

In the morning we piled after the main Spanish body,

which had retreated into the mountains near Las Marías. Darkness overtook us at the bottom of a long slippery mountain road, where we lay exposed to a night attack. The Spaniards, however, missed their opportunity; and the next morning Colonel Burke's battalion climbed the mountain and potted them in the valley just beyond. We captured the Colonel in command—he had been badly hurt by a fall—his Lieutenant-Colonel with him, and a fair number of their men. I took an antiquarian's pleasure in appropriating their doctor's operating set, which might have been used by Ambroise Paré.

That little fight was the last engagement of the war. In fact, it occurred after the Protocol had been signed. They had had news of the Protocol in Mayagüez, but we did not get it until after the skirmish. I don't know why. But I suspect that some messenger deliberately lingered by the way, in order to give his comrades a chance to bag the game they had been pursuing.

Then came weeks of camping right there in the mud, for we had been ordered not to stir from our positions; and I was turned loose on Mayagüez—a city of some 20,000, with beautiful streets, homes of wealthy coffee planters, and a lovely outlying countryside. Now it should be noticed that up to this period neither Bailey K. nor Lieutenant Ashford ever had evinced the slightest emotion at the sight of a pretty girl. It is well known, however, that the power of Venus never is more apparent than when Mars is plying his trade of extermination. Before I had been in Mayagüez very long—it was at a dance given in honour of the first marriage between an American officer and a Puerto Rican girl—I came under the same gentle spell, and met the lady who for the succeeding thirty-five years has followed my fortunes.

At the close of the war, there was wild confusion in the mountain estates, which were mostly coffee plantations owned by Spaniards. Ignorant country people, thinking that the Americans would appreciate any little token of militant devotion to the new Flag, fell incontinently upon the defenceless Spaniards, shot them and their families, and burned their estates. The Army was kept pretty busy restoring order among these people; and to travel about alone was more or less of an adventure, for some of the bandits had acquired a taste for shooting at anybody who happened to come along.

A few weeks after our military occupation of Mayagüez, the Regimental Colonel sent for me and told me to ride northwest over the mountains to Aguadilla, where Columbus had landed four hundred years ago. I was to report the condition of the countryside, and also the physical state of the people en route. That official report, still grimy with the mud of rich tropical hills, bears my first impression of the Puerto Rican *jíbaro*—the picture that was to stare me accusingly in the face, until I had solved the scientific problem which it represented. I reported to the War Department that the country people were “a pale, dropsical, unhealthy-looking class, evidently suffering from lack of meat, although there must be something else, not yet understood. . . .”

But what the bullets of old Spain and my subsequent ride to Aguadilla had not done for me, now was done quietly by the mosquitoes of Mayagüez. One morning I was unceremoniously shunted, delirious with malarial fever, on to the deck of the hospital ship *Relief*.

By the time I reached New York, quinine had done its

work thoroughly, and I was bellowing to go back again. In view of my prospective marriage, they let me do so; and this time I was assigned to duty in the General Hospital at San Juan. There I was placed in command of all Medical Department troops, which had been organized into a large company for training.

The company was just like any other company, and the component parts looked like rag dolls and acted as if their heads were stuffed with sawdust. However, we had in our military establishment one very notable man, Colonel John Van Rensselaer Hoff, scion of one of New York's old Dutch families. Whether Colonel Hoff ever had even a decent regard for the calling of a physician is, to this day, a moot point—in the minds of some Army officers who did not know him. But he was famous all over the Army for his military yearnings. It was said of him that he didn't care if you didn't know how to take out an appendix, but that he cared a lot if you didn't know how to drill a squad of four men. The ritual of the drill was a solemn thing to him. I have seen him, a full Colonel, with sumptuous uniform and the manner of a Von Hindenburg, drill a squad of four gawky hospital-corps men until they could do shoulder litters and order litters in a manner truly military. If it had been possible to give a hypodermic injection "by numbers" in the impressive military style, he probably would have incorporated the routine into his book, "The Drill Manual for the Medical Department."

But, despite those who would have denied to Hoff the fundamental instincts of a physician, and those who skillfully trapped him into ridiculous military exaggeration by arousing his splendid personal courage and Dutch obstinacy, the fact remains that it was he who, as President of the Superior Board of Health of the Island, created a vac-

cine farm at Coamo and made enough vaccine from calves there to protect the entire population against smallpox. This was no small item for health; for at that time, shamefully enough, there was in Puerto Rico an endemic of that loathsome preventable disease.

The truth will out; and the truth here is that this Medical Officer realized, before any of the rest of us did, the incongruity of looking upon a Medical Officer as though he were different from any other Army officer. Military rank was the only money current in the Army. And after Colonel Hoff had been made to feel that he was only an officer by courtesy, he had made up his mind that he and all the rest of us should be officers in reality. In those days we made fun of him. But to-day we recognize in him a prophet who in life was mocked for our sake and for the sake of our profession in war.

How often have I seen him, after one of his fearful military inspections of our hospital and its personnel, lay aside white gloves and sabre, and say with a charming smile: "And now let us go back to the wards and visit the sick." And he would have a kind word for everyone there.

One of Colonel Hoff's pet ideas, which he immediately put into execution, was that there ought to be an Officer of the Day at the Military Hospital. Now there were only two Medical Officers available for this duty—myself and another unfortunate. Moreover, the sting in the title was that it did not mean what it said, for, in addition to wearing a sabre all day long and being constantly on duty, the unhappy Medical Officer was made to sleep on a cot in a small Orderly Room and respond to all military calls during the night. This meant that I was confined every other night in the vilest duress, while my pretty fiancée was left to explain why I was unable to be crooning love songs to

her at a critical period in our lives. Here it was December, and we were to be married in February. But not even the highest duties of holy matrimony, let alone of courtship, can stand in the way of strict compliance with military rules and regulations; and so I had to sit cursing, every other night, and wish that the chief with the iron-gray eyes and the mannerisms of Frederick the Great could be made to swallow some of his own medicine.

Ironically enough, it happened that in that hospital there was a certain Captain of Artillery who, like myself, was on the eve of a romantic adventure. He was under treatment for abscess of the liver, and the strictest orders were given him to remain in bed. By regulations, the Captain, who was much my senior, was absolutely under my control. I did not recommend that he stay in bed: I ordered him to do so, in my sternest military manner. What was my horror and dismay to find that one night he had arisen in his wrath, dressed, gone downtown, and returned a married man. This raised a nice point of discipline. For once, however, even Hoff quailed before the giggling officers' club, when they asked him what punishment he thought adequate, in the premises, to uphold the dignity of the Medical Department.

Of course, despite all my fuming, I was much more reasonable and sedate than that lovesick old Captain of Artillery. February came at last; and I was married at the home of my father-in-law. Although he was by profession and tradition a Roman Catholic, he consented, in a spirit of great liberalism, to have the ceremony performed by Chaplain Brown, an Episcopalian.

One day orders came for me to proceed to Ponce and assume command of the General Hospital. Naturally, Mrs. Ashford and I had very little to pack, so we decided to go to Ponce by way of Mayagüez, her old home, and make the trip a sort of honeymoon.

Travel in those days was by coach, and the horses were little undersized rats that had to be changed every five or ten miles. After our visit in Mayagüez, we set out for San Germán early one morning, and arrived there in time to have lunch with María's aunt and uncle. But the afternoon downpour, inevitable at that season of the year, was particularly heavy, and we had rivers to ford, so we took a hasty farewell and started on our lumbering way. No sooner had we crossed the first river than it began to rain in earnest, and by five in the afternoon a passing *jíbaro* told us that the river just before Yauco had become an impassable torrent. I insisted on going forward, nevertheless.

But in a heavy bit of woods in a lonely stretch of the road there came a shout of "*Alto!*" (Halt!) followed by two revolver shots. Our driver, an arrant coward, gasped: "*El Aguila Blanco!*" (The White Eagle!), leaped down, and fled into the forest, leaving the horses to trample the reins.

In a moment the carriage was surrounded by a gang of road toughs, all more or less intoxicated, who ordered us out into the streaming rain and immediately began to ransack our belongings. I had no weapons, and there was not a house in sight. They ordered us up a trail leading off from the road.

After a stony climb we reached a large deserted house, and all of the bandits shuffled in behind us. All were

armed with big machetes and revolvers. I could not understand much Spanish at that time, but my wife explained to me that they were using foul language and wanted money and something to drink. I told her to tell them that I had no money except what I needed, and no liquor, and to be pretty careful what they did and said, because I was an officer in the Army, and her father was a prominent man in San Juan who would make it hot for them if anything disagreeable happened.

I first thought of wresting a revolver and machete from the nearest man and doing what I could. But there were twelve of them, so I knew that it wouldn't last very long. Then a more feasible idea popped into my head. The man next to me was very drunk, and was at that stage when men boast of their physical prowess. I told my wife to tell him that I would never believe he was as strong as he said he was until he proved it—that I dared him to swim through the Yauco River, which they said no one could cross. Let him do that, and a friend of mine on the other side would pay him ten dollars and let him go. He was just drunk enough to accept the dare. Off he went, carrying a hastily scrawled note to Lieutenant Valentine, the Cavalry Commander at Yauco.

The rest had not heard any of the conversation. I doubted whether that man would ever be able to swim the river—even if his befogged brain did not warn him first of the mess which he might get himself into. It was an interminable wait. The only light was a candle stuck into a board. Once I thought I heard the faint beat of hoofs, but only for a moment. A few of the men had gone down to the carriage to finish rifling it, but the rest grew more familiar and abusive by the minute. The chances of our living to reach Ponce seemed about one in a thousand.

Suddenly the air was filled with shots. I had forgotten that my friends at Yauco were old Indian fighters. They had dismounted down the road, and were closing in on foot. However, the White Eagle knew the *monte* better than our crowd did. He escaped with his whole band, to plague the south coast of the Island and serve many others as he would have served us; and he led the authorities a merry dance before they finally got him.

Chapter III

I

IT WAS morning, golden-green, jasmine-scented, in the island of Ponce de León. I was twenty-six; lieutenant in the Army of the United States; and I was feeling that sense of personal possession which comes to every commanding officer as he looks over the domain placed temporarily in his charge. This charge of mine—a souvenir of feudal Spain—was a formidable, thick-walled, yellow stucco structure. It stood on the brow of a hill swept by cool breezes; and from it I could see across the town of Ponce, which lay sprawled out in the lap of an enormous sugar-cane field, to the sparkling Caribbean Sea beyond. Already the shadows cast by the shapely mangos were contracting into shade beneath them; but Ponce, of course, was still asleep. It was a summer morning like any other.

I sat down in the little Orderly Room and called out: "Sergeant, bring in the first man."

The first man was sick, and so were all the rest, for this was the daily sick-call. The second man entered, and the third; but when the fourth made his appearance, I called for a light. It was growing unaccountably dark. . . .

There were a few moments of the silence, deathly, oppressive, that precedes the hurricane, and then came the first gust. Out went the lights. The study lamp shattered against the paved floor. Within five minutes all was enveloped in ghostly gray obscurity and a whirl of wind.

At intervals amid the infernal din, we would hear—by

contrast not very loud, at times almost unnoticed—the sickening crash of some modest shack thrown bodily against our stout walls and crushed like an eggshell. Homes, these, of the poorest of the poor. Built of old boxes and scrap-wood. Roofed with corrugated zinc sheets, or with kerosene tins beaten flat. They harboured ten times their legitimate quota of humanity. Evicted brutally from rude shelters now dashed to bits against the very bulk around which they had seemed to huddle for protection, the homeless victims, dragging their little children and old people with them, groped about in the half-light and murk, gasping for breath in that mighty blast. Through air filled with bits of trees, timbers, and hurtling sheets of roofing sharp as a razor, they struggled toward our big barred gates—which now stood wide, their only refuge.

Within our hospital wards, behind storm shutters and doors hastily battened down, they were safe. Our flat brick roof afforded no purchase to the long fingers of this maniac tempest. Our broad Sevillean patio was well-paved and severely military in its simplicity. In the centre of it alone was there any destructible object, a skeleton steel tower, seventy feet high, just erected to hold an emergency water-tank. There it stood, ugly and out of place in this tropical Alhambra, with its feet cemented deeply in granite blocks sunk to support it, and with heavy rope cables still lashing it to the four corner pillars of the cloister. When the first fury of the hurricane began to abate, the ugly tower was seen to be no more. At some time, in that hour of howling wind and hurtling trees and houses, it had been swept entire over the roof of the hospital and dashed to ground two hundred yards away. No one saw or heard it go, or even knew that it had left us, until San Ciriaco expanded his mighty chest preparatory to blowing the other way about.

Now began a sadder procession, the wounded—mostly with cuts and bumps that were terrifying to the recipient, though not of great surgical importance. But many of all ages were carried through the gates, to be treated for fracture of leg, arm, or skull. And from time to time there would struggle in a group of three or four men, bearing some limp unfortunate with fearful wounds from sheets of flying zinc in chest or belly or thigh. Before long our hospital wards were full.

Our homeless guests, now hungry, squatted in silence, gazing blankly into space. Few complained; for was not this an Act of God? Was not this day, and this disaster with it, sacred to San Ciriaco, whose anniversary it was?

That morning, however, I took no note of the miracles possible to applied theology. I could not feel proper anxiety about my military stronghold, nor even about the battered populace, upon many of whom I was compelled to perform impromptu interventions without time to look up my surgical anatomy. All my thoughts were out beyond the foggy green débris of uprooted trees, demolished houses, fallen telegraph poles, and tangled wires; were out at the little cottage on the edge of the sugar field, where at dawn I had boarded my mule ambulance to attend sick call, and had left my bride sleeping.

I called my assistant, a Scotchman, and gave an order: "Take charge in my place until I return. We've done most of our surgical cases, and the wind is beginning to ease up a bit. I'll take the ambulance and that little Cockney we've just received from San Juan as an orderly, and be back soon."

"Where are you going?"

"For my wife."

"You will bally well leave the ambulance here safe in the stable. After what we've seen this morning, you'll be

lucky to get there on foot, let alone in an ambulance with skittish mules."

But in those days I had a quality which should have endeared me to my mules, at least; and out rumbled the ambulance. It went to the foot of the hill and halfway down the first street. And there it stuck. The Scotchman was right.

And what a sight was Ponce—the comfortable old creole town of 25,000, disdainful of the Spanish capital far to the north behind the abrupt wall of green mountains—the town that sniffed at the bureaucratic airs of the rival city of St. John the Baptist, and, gracefully aloof, proclaimed herself sovereign of the spirit and culture of Puerto Rico. Bedraggled and crushed, her beautiful old trees prostrate, her climbing roses and sweet honeysuckle hanging in wet strings from her shattered balconies, her architecturally uncouth or gaudy pine-board houses stripped of all that Nature had lent them of a dignity not theirs, the real town of Ponce was exposed and defenceless against the critical eye.

When I reached the little cottage beside the sugar plantation, I found it badly battered, soaking wet, unroofed—and deserted. Anxiously inquiring at houses still inhabited, I learned that my wife had been taken to the home of the Swedish Consul some five hundred yards away. And there, happily, I found her unscathed. The household had lined up along a rope, and with great difficulty had crossed the park to the Consul's home. They had had to go against the wind, with men pulling on the rope to prevent them from being blown away. At that time the air had been filled with flying wreckage, and my wife had seen one little child's arm cut off at the elbow by a section of zinc roof.

I found her willing enough to stay where she was, although the house was filled with refugees. However, I knew that it would be only a short time before the wind

would begin again, blowing the other way with redoubled force. What was left of my ambulance finally made its way down to us; and I took her up to safety behind the walls two feet thick.

We made it just in time. The fury of the storm was renewed until nightfall—and then the heavens opened. Though the tempest died down, the deluge continued for hours and hours. About nine o'clock out of the prostrate city below us came shots and cries for help. I was convinced that ghouls had taken possession of the town. In an hour or so, however, the horrible truth came to us by word of mouth. The so-called Portuguese River, normally a despicable little brook, had joined with another streamlet, and the two, receiving the mighty drainage of the whole range of nearby mountains, had come plunging down without warning to invade the city in one overwhelming yellow flood. Whole blocks of houses were suddenly inundated up to the eaves. Even the central plaza and the Cathedral were awash. Many a richly carpeted and caparisoned home of the wealthy was overlaid for days with water and muddy slime.

Two days later, at the hospitable insistence of the Swedish Consul, an old friend of my wife's father, we returned to stay at his house until we could find new quarters for ourselves. Ponce was anything but a pleasant place. When the water at last began to recede, municipal trash carts went about by day collecting the dead. Nights were made hideous by shots, screams, and indescribable crimes. This ghouliness, which developed in an untoward number of the populace, was largely due to a sudden revival of the old intolerance toward the former rulers of the Island, the wealthy Spanish merchants.

Food at once began to get scarce. Ponce was literally isolated by raging torrents and by wreckage heaped in the

roads. Milk was soon selling at a dollar a glass, eggs at fifty cents apiece—if procurable at all.

The wide path of the cyclone had destroyed fully two-thirds of the plantations on the Island, especially the coffee plantations; and along with them had gone the living of the poverty-stricken people. In desperation, droves of these agricultural labourers, or *jíbaros*, came straggling into Ponce; and similar scenes of privation were being enacted in over two-thirds of the area of the Island. Had not the army—then about to terminate its authority over Insular affairs—fed almost 800,000 people for nearly a year, the mortality would have been terrific from starvation alone. I was very fortunate at this time to receive encouragement and assistance from my brother Mahlon, who was visiting us as a young medical student.

Epidemic disease, however, was what loomed largest among the immediate consequences of the hurricane. In reality, it was only a shadow of what we had thought it might be; but there it was, none the less. Thousands suffered from a severe current diarrhea, typhoid fever spread, and the results of exposure to the storm swelled the number of the sick.

Therefore, in view of our wards already crowded, and of our streets full of hungry, ghostly pale refugees, I sent a cable—all telegraph wires were down—to the Chief Surgeon of the Department of Porto Rico. I asked, first, for authority to use the field-hospital material, left from the war and stored in my storerooms, in order to open a civilian hospital; and second, I asked for rations for two hundred and fifty people at sixty cents a day, wherewith to sustain refugees under my charge. Both requests were promptly granted.

The field hospital was opened before the end of August, 1899; and into it streamed waxlike spectres who had stumbled wearily in from the mountains, which the storm had swept bare and brown. Soon the hospital was chock-full. Those poor bedraggled creatures even sat around in the mud and rain, waiting for our men to finish putting up the tents. I was told to inspect them and report. Inspection revealed flabby flesh and ghastly pallor, such as I had seen in my lonely pilgrimage to Columbus' landing-place long before the cyclone.

The commissary was depleted, save for the one thing they were most in need of—meat. But they would not eat meat. I fell upon them like an avenging angel:

“What? You are dying of anæmia due to lack of meat, and yet you won’t eat it? I command you to eat it—a pound of it a day! Sergeant, see that they eat it, and let me know immediately of the first man, woman, or child that dares to disobey!”

They meekly ate it. Had I but known how low their barometer of resistance had fallen after that storm!

A few days later the sergeant came back to his Commanding Officer’s room and started to speak, halted, stammered and stumbled, and finally lapsed into embarrassed silence. I curtly ordered him to “go on and say it.”

Then the sergeant, with a mighty effort, blurted out: “Lieutenant, if you keep on a-stuffin’ of these here yeller boys with meat, be damned if you won’t have us a-buryin’ of ‘em next!”

Then he explained in a soldier, if not soldierly, way, that the life-giving meat had produced a furious diarrhoea, “an’ the only way they says they can be cured is by givin’ ‘em rice an’ banes, an’ grasy codfish.”

I went out to investigate—mentally resolving, meanwhile, to look up the extreme punishment prescribed by regulations for an insolent Irish sergeant of the old school. However, on my return two hours later, I called in the sergeant and said as severely as I could: "Sergeant, I want you to order four times yesterday's amount of rice and beans, and codfish." As the sergeant walked briskly away, the rest overtook him: "and one quarter the amount of meat."

As soon as the sacred rice, beans, and codfish arrived, everybody in camp began to purr. But not the faintest tinge of red blood came into their faces. Moreover, they kept on dying. It must be said that they died happily, and with their stomachs full; but their mortality was extremely embarrassing, nevertheless, for one young Medical Officer.

I catechized my wife, but she only replied: "That is the anæmia of the country. They all die of it eventually. They say it is due to lack of food."

"But I fed them by order," I indignantly exploded, "and the ungrateful things keep on dying!"

"Well, my dear," she sweetly retorted, "it's not *your* funeral, you know; and you seem to be doing the best you can."

But I did not believe that I was doing the best I could. I began with the most obvious thing, and proceeded to examine the blood. The results were shocking—the picture of true pernicious anæmia, and profound, at that. But who had ever heard of a whole agricultural class dying of an *epidemic of pernicious anæmia*? It was unthinkable. Hold on! Look at these eosinophiles. What were they doing, so numerous, in pernicious anæmia? And now I had to explain to my patient wife that the white corpuscles of the blood are normally five in variety, the "polys," the lymphocytes, the monocytes, the basophiles, and the eosinophiles; and that the last should not exceed four per cent—

yet here they were impudently running up to forty. What on earth . . . !

“Oh, yes, now I remember something I read out of a journal not long ago,” I murmured to myself. “A man by the name of Brown found these prominent strawberry-looking eosinophiles to be increased in an infection by the worm causing pork measles. Maybe these anæmics have worms!” And I began to laugh—by myself—at myself. I sent my tired wife to bed; but I sat up far into the night, until the chilly morning land breeze began to blow.

And I went to bed still intrigued, with eosinophiles shooting like comets before my eyes. The idea that a frightful epidemic anæmia with a high death rate might be caused by anything so commonplace as worms! There were charlatans who made a living by treating worms in dogs and man, and they were known as “worm doctors,” too. I remembered that lots of the children in the Children’s Hospital back there in Washington had had worms, but those cases were all rosy enough—save the black ones. Next day I would go again at this blood. And then I would examine the fæces—a tremendous jolt to my pride, if not actually unscientific.

The next day came. And what happened is told at the beginning of this chronicle.

The veil had been lifted from the face of the anæmia of Puerto Rico. Now to remove the cause, watch these people get well, and publish the results.

It never occurred to me at any time that anybody would have the temerity to doubt that cause, or to be indifferent in applying that knowledge. I had visions of everybody falling over each other, in their eagerness to cure all of these wretched people overnight. But it was to be more than four years before I could attract the slightest attention to the meaning, even, of my find.

However, let us get on with our present problem: The egg once identified, it now remained to get hold of the worm. But to do this, thymol had to be given to the stolid subject of that afternoon's raid on the photographer. The highest dose safe to give by mouth, according to the U. S. Pharmacopeia, was *two* grains. In Manson's book, heretofore referred to, was a particularly harrowing account of the death scene and preceding damage to the interior, discovered at autopsy, of an unhappy coolie out in India. It was said that a well-known authority had scientifically murdered him—quite unwittingly, of course—with *sixty* grains, or four grams, of thymol.

"Did Napoleon hesitate at critical moments, even if it cost—" I did not finish the sentence; for my enthusiasm, though extreme, was still insufficient to lull my conscience—I not being a real military man as Napoleon and many of the line officers of the Army of the United States conceived the term. "Well, I'll give him one gram, *fifteen* grains; that's one quarter of the dose."

And I did it—but first I looked up the antidotes for carbolic-acid poisoning. And I did *not* do something that the earlier investigator unfortunately had done—that is, give the drug with a good chaser of pure whiskey. That chaser was what was supposed to have killed that case. It dissolved the thymol, and so got it absorbed. The proper procedure was to hustle that drug through the intestine with the least amount of absorption.

The medical Solon slept not that night. If the *jibaro* patient had not been so intoxicated by the poisons of his disease, the intense anxiety of his medical adviser, as evinced in nervous half-hour visits until dawn, would have scared him to death.

At six-thirty a.m. the gravid patient presented me with

a family of tiny worms. They were eagerly seized upon with forceps, placed under the long-suffering microscope, and found to correspond with another picture in Manson's book, save that they had no front teeth. However, they might not have had time to cut them. Under the circumstances, this seemed a minor matter—one safely to be overlooked. Later, that toothless worm was to rise again like Banquo's ghost, to disturb on many a night the sleep of this enthusiastic investigator.

The reaction in Ponce to all this news was rather confusing to a young Anglo-Saxon; for I found that I had furnished material for a tremendous joke, not only locally, but all over the Island. The newspapers had a lovely time, just as they later had in the United States when the laziness of the "po' white trash" was also attributed to the same cause.

Fortunately, I had very little time to brood over what people thought of me. I cured up nineteen anemics in my field hospital with thymol—the series contained one more case, one of pure tuberculosis, for contrast—and I hurriedly sent a paper on my findings to the *New York Medical Journal*, which published it tardily, in April, 1900.

I now followed my wife to the United States on leave, carrying a bottle of my precious worms with me.

3

There I sat and brooded, for I had nothing else to do. I could get nobody sufficiently interested in worms to talk about the precious new-found treasure in that little bottle. To be sure, the Medical Corps of the Army had not laughed and doubted. But how could they possibly realize, as I did, what my discovery meant for the future?

Finally, I became desperate and went to the office of my quondam professor in helminthology, Dr. Charles Wardell Stiles. Out of deference to Stiles' professorial status in my Alma Mater, I had given him a passing flourish in my article in the *New York Medical Journal*, alleging that of course this man knew all about such things. Now, however, my conscience was troubling me. I went to him with a certain amount of shame-faced reticence, because during my entire investigation I had not even thought of Stiles. But something had to be done to keep the subject alive; and I felt so scientifically generous that I was even going to give these worms to Stiles, and leave the whole parasitological side of the question to him.

Stiles was not in the city. But Albert Hassall, his assistant, was. Hassall was a red-curly-haired, florid, quiet man, and was smoking a pipe. The young visitor dwelt not in the halls of his memory, and the name was requested. This was given but produced no visible effect, the pipe not even being removed from the mouth.

The purpose of the visit was solicited and the bottle of worms handed over.

Still the pipe remained in the mouth, as the bottle was leisurely turned over and over. Finally, the cork was removed, and one of the worms was speared with a needle, laid on a glass slide, placed under a microscope, and subjected to the scrutiny of the wise man. It was a very short scrutiny. Hassall looked at the repatriated Ulysses closely, then again at the worm, and then back at Ulysses, but said nothing.

It was left for me to break the silence: "I'm not a professional helminthologist, but this worm is the cause of a tremendously important anaemia in Porto Rico that yearly kills a great many thousands of people. It is the *Ancylostoma duodenale*, and I have reported the study of nineteen

cases and sent the report for publication to the *New York Medical Journal*. There is, therefore, no question about the priority, and, as I do not wish to parade as an expert on parasites, which I am not, I thought that I would like to turn these worms over to Dr. Stiles."

"Just why are you giving these to Stiles?" asked he.

"Why, I've just told you," I replied.

"But if they are *Ancylostoma duodenale*, why do you give them to him? Is there nothing else?" he insisted.

"Well, yes, there is something else. The damned things have no teeth, and of course they should have teeth."

"And you want to give them to Stiles, do you?"

"I think I've said that I did several times."

"Look here," he exploded (and the pipe came out of his mouth for the first time), "why don't you describe them yourself?"

"Oh, I'm quite satisfied with having discovered the cause of the anæmia of Porto Rico. I don't want to pose as a parasitologist. If there is anything funny about them, let him describe them and get the credit for it, for, after all, he was my professor once. The big thing is settled—the cause of fatal epidemic anæmia."

I did not add, as I might have done—for I had frolicked too much when I was qualifying in parasitology at school—that my recollection of Stiles' lectures was limited to an anæmia caused in sheep by a fluke.

"Very well," said Hassall drily, and the pipe went back into his mouth.

That day was a grey, sad, drizzly one in early January, 1900. I had intended, after my call on Stiles, to pay a visit to my old preceptor, Major Walter Reed, at the Army

Medical School, but it was pretty late by this time, and everybody should have gone home.

I entered the deserted building, however, and went straight to Major Reed's office on the third floor. And there I found him, alone, and after hours, and there were traces of tears in his eyes.

"What is the matter, Major," I asked, "are you sick?"

"No," he replied, "I'm mad. I've just been ordered to the Philippines, and I have a big idea about yellow fever and want to go to Cuba and work it out."

"Why don't you get your orders changed?"

"The Surgeon-General himself (General Sternberg) wants me to go."

"Why don't you get your friend the Adjutant-General (General Carter) to change your orders?"

"An officer should obey orders as they are given," was the answer.

"Yes, and a doctor in science should obey his conscience," I replied.

Major Walter Reed's orders were changed.

Lieutenant Ashford's orders, also for the Philippines, were not changed. Although I had given good advice to my superior at a crucial moment in his career, I hadn't the nerve to ask for anything so big. I was young; and the indifference back in Puerto Rico had done nothing to tone me up.

But an inscrutable fate took me in hand. I fell ill with diphtheria; and one night I almost died. That night happened to be the one on which I had planned to leave for California to take the transport. Another man went to the Philippines in my place.

They didn't need me over there after that, and I was sent to Fort Slocum. But not even in that intensely American excrescence on New York City could I be separated

from what was, by now, my ever-present problem—the anæmia of Puerto Rico.

A stone's throw from David's Island, which was devoted entire to the Army post, was Glen Island. This wooded islet had been rented, for the purpose of exhibiting little colonies of foreign people, by a good old sport, who confided to me that he liked champagne when it wasn't too "corky," and who had spent his whole life up to his present ripe age in exhibiting pretty girls and tickling the American palate with new and outlandish sensations. One year he would have Eskimos living in glass huts frosted to look like ice, with real Eskimo dogs and sleds; another, he would show a community of Hottentots, as unclothed as New York laws would tolerate, with their round straw huts and African drums. And lo and behold! this year he had imported and exhibited, alongside of a group of Sioux Indians living as they lived, a colony of Puerto Ricans, living as *they* lived, in their little thatched houses, and making the so-called "panama" hats. These *jíbaros* were from Cabo Rojo, a coast town noted for the excellent straw hats made there for a century or so. And they ALL had hookworm.

A most intimate friendship sprang up between the young military doctor and these homesick sons and daughters of Borinquen, who were perfectly delighted to find someone who could speak to them in their own tongue, and to whom they could complain—for the *jíbaro* loves to complain. They were useful to me not only as sources for a continuation of my study, but also as living examples of this new disease, on which I now was asked to discourse at the annual meeting of the Westchester County Medical Society. I did so; and no detail was missing—even the sacred eggs were brought into the glaring sunlight of New York's sophistication.

It is laughable to think that here of all places, and prob-

ably the only place in our vast country, Providence had staged the exact picture of victim and worm with all the local colour. That dramatization of my subject, had I been the impresario, would have cost me all of my salary for ten years to come.

Chapter IV

I

BUT one day, another drizzly grey day, Major Robert Howze, a picturesque and profane Cavalry Officer, found me brooding alone. He pierced my reserve with his bluff and kindly militarism, and I made my short confession. So! I wanted to go back and raise some more hell in Puerto Rico, did I? Well, perhaps he, Howze, might get the War Department to send me. Who knows but that it might be the saving of some poor soldier's life . . . at Fort Slocum!

The last remark was neither necessary nor soothing—though now it seems amusing enough. At any rate, thanks to some kind but secret words pronounced by Howze in Washington, in 1901 the worm maniac went back, assigned in orders to Ponce itself.

There I met Joseph Goldberger, whom I had known in Washington some time before. Joe was Public Health Officer for the port. I tried to seduce him to join me in an attack on hookworm, but Joe refused to be seduced: he wanted to play with filaria—"besides, all that anaemia business is a matter of malnutrition," quoth Joe, himself another maniac, destined to explain the scientific reason for pellagra.

Then came Walter W. King to take Joe's place when he was relieved. King was very matter-of-fact, sensible, and had a quaint sense of humour. When he was around, he usually managed to keep my Celtic blood below boiling

point. He was honest to a fault, absolutely faithful always, and brave. It took a brave man to ostracize himself from his Spanish-speaking colleagues and furnish them with noisy amusement. They referred to us as Don Quixote and Sancho Panza. We agreed to ask to be given charge of a ward in the Tricoche Hospital of Ponce, there to study and treat anæmia exclusively.

Now, Aguerrevere was the Director of the Tricoche, and his was a political job. He belonged to the pro-American party and dearly loved a fight—a taste which was abundantly gratified by his colleagues, who were almost all of them reactionaries and hungered and thirsted for the ceremonious nonsense of the good old feudal days of Philip I. The first thing Aguerrevere did, when he came to take over the keys of the Tricoche Hospital, which was administered by a religious body, was to remark acidly: "Sister Superior, I find considerable more cleanliness of soul than of body in this institution," an ingenuous remark which was promptly published and brought furious denunciation and wild applause from the contending factions. This was what Aguerrevere loved, and this was why he took us in. He smelled another fight.

In a few months, King and I collected one hundred cases, most of whom came to us looking as though they had but a few hours to live; indeed, eleven died; a shocking mortality, as we were later to discover, but in those days considered a very marvel of professional skill. It was hailed as a triumph by everyone, even by the heathen unbelievers, for, as Aguerrevere said, "*Before they all used to die,*" an abuse of poetic license which people who knew him generously overlooked, especially if they belonged to his party.

This made quite a ripple. That is to say, it made quite a ripple in Ponce. The Powers in the Capital, San Juan,

moved not; but they did thoughtlessly move a certain Captain Bailey K. Ashford up to the mountain post in Cayey—which was a cavalry post, and very military.

But the few miles between us could not keep King and me apart. Neither of us were satisfied with our first triumph. It was too local, and soon we began to hatch another *coup*. My idea was boldly to charge the Health Department of the Island with neglect.

King said: "You Army people have no right to fool with civil affairs."

I parried that this hookworm disease had been fully explained to everybody four years ago by me, and, while everybody had seemed at least interested, nobody had done anything. I continued: "The only way we will ever get anywhere is to get ourselves into trouble. Now here is a noble opportunity. I can be torn to pieces by wild horses if the Army finds I have been dipping my spoon into civil porridge, but in the trial the truth will have to come out. I had rather be tried and fired a thousand times than let this anæmia mortality keep up any longer."

We compromised by compromising ourselves. King got the editor of *American Medicine* to accompany our scientific report of those hundred cases with an acid editorial, calculated to arouse the most placid Director of the Health Department of Porto Rico whom it would be possible to find. The other hyena prepared a sort of inflammatory manifesto to the Porto Rico¹ Medical Association. The object of both was to get into trouble. But it was only the "discoverer" who succeeded.

The Governor wanted to know what business it was of an Army Medical Officer, all of this, and the Army Medical Officer told him. Moreover, not only Governor Hunt himself, but the President of the Executive Council, Mr.

¹ Old spelling, changed to Puerto Rico in 1933.

Regis Post, became interested. After laughing a while, they bluntly told their victim that he was to let the Health Department alone, and that they would provide us with \$5,000 to study and treat anæmia in Porto Rico.

The Governor asked how many people we could treat for \$5,000. I ventured to say five or six hundred, and he sternly remarked: "Well, you will get your money, but God help you if you don't cure those five or six hundred people!"

They recommended to the Army, who then, as always, stood by their man, to have the offender detached for the purpose in view, and Ashford and King started their campaign in Bayamón on March 6, 1904, in an army field hospital loaned by the faithful War Department. This Anæmia Camp, as it was called, was pitched with military precision in a semi-marshy pasture on the juicy banks of the Bayamón River. When Captain Bailey K. Ashford left home, wife, and two small children, it was to occupy Tent No. 1, where he could be on the spot day and night.

Fortunately, there were two medical scientists already on the ground at Bayamón. The first was a fiery little blue-eyed Prussian, who was then over sixty years of age, and who had managed to cover efficiently the not altogether germane fields of medicine, surgery, sanitation, archeology, ornithology, and botany. But Agustín Stahl, for that was his name, had a wholesome regard for scientific medicine; and from the very beginning he was a firm, and often too firm, supporter. Every day found him on the narrow uncomfortable little balcony of the Bayamón Municipal Hospital near our camp, where we examined the fæces of all seeking treatment. He came there, seemingly, in order to make impromptu speeches filled with complicated eloquence in the Spanish language to the wall-eyed populace seeking a sign, not a reason.

One day when he was in one of his mellowest moods, he referred to the unwashed, barefooted line as "the poor neglected wards of a maternal government whose duty toward them was kindness, forbearance, and great acts of charity." One of them had been unsuccessfully trying to get Dr. Stahl to pay a professional visit to his bedridden wife; and seeing him in such a commiserating frame of mind, he now pulled him by the coat-tail and said: "*Doctol, a ver si Ud. me jira una visitita a mi vieja que está tumbá de viento con sangre*" (Doctor, let's see if you'll make a little tiny visit to my old woman who is down in bed with wind on the blood). Whereat, Stahl suddenly veered round in purple rage and, after cursing him skilfully in English and German, did an exceptionally complete job in Spanish—even going so far as to "mention his mother" to his face.

But Stahl was a hard worker, as he was a hard talker, and it was to Stahl that we confided the Bayamón station when, in a month, overwhelmed by numbers, we pulled stakes for a more suitable location.

But the other citizen of Bayamón, Pedro Gutiérrez Igaravídez, was fated to join with King and me in forming a triumvirate which neither time, nor distance, nor conflicting interests, nor even mischief-making outsiders have ever been able to part. He was—and is—a perfect example of Spain's impetuous nobility, handsome, with an almost abnormal sense of honour, chevalierly correct behaviour, and, above all, loyalty. Gutiérrez was a well-read man, ambitious in the field of investigative medicine. He had a good practice in the large town in which we were working, and a host of friends. To part with them, and go with us in our outlandish enterprise, meant an absolute severance of all of those professional relations which would have made him to-day the wealthiest physician in San Juan.

Moreover, his mother was dependent upon him, and she was dying; and the salary paid him on accepting a position as member of the Porto Rico Anæmia Commission was ridiculously inadequate; yet he threw into this venture his life and his fortunes, thus inviting the criticism and even the ridicule of those who constituted the society in which he lived.

It had been our intention to finish up our work in Bayamón before moving on, but this time we ourselves had utterly failed to see the magnitude of our undertaking. Our clinics kept getting larger and larger as each improved or cured case spread the news farther and farther afield, until there came a day when we were literally swamped and either had to move or succumb.

When I discussed the matter of a move with Governor Hunt, I advocated Utuado, but he felt that, as this was the centre of a party said to be anti-American and very hostile to the idea that the anæmia was caused by anything but hard times and bad treatment of the natives, it would be unwise to risk failure at such a crucial period. I pointed out that if we succeeded, as we proposed to do, the effect on the rest of the country would be correspondingly strong. And so we went, armed with a letter to the only man in the town in whom the Governor felt sufficient confidence to ask the favour—because he had appointed him mayor—requesting that the Porto Rico Anæmia Commission be assisted in its demonstration that the anæmia of the Island was really a curable and preventable disease.

We secured a picturesque, rambling old country house surrounded by a second-floor balcony. It stood on the edge of the River Viví, and was backed by a coffee planta-

tion with fine upstanding shade trees. It was like a box in the theatre. In the immediate foreground was our camp hospital, the big tents enclosing a hollow square. All around us in the background were the graceful curves of heavily wooded mountains enclosing the picturesque old Spanish town of Utuado, with its commodious comfortable creole homes of well-to-do coffee planters, and with its big yellow stucco church on the flagstone plaza. There the band played on Sunday nights, and the pretty girls walked around and around and carried on a sedate flirtation with the young men standing like a fringe behind the row of rocking-chairs placed there for the comfort of mother and father, uncle and aunt.

But the hour which furnished the stage for our dreams was midnight when, all silvered over with moonlight, the town lay slumbering beneath its coverlet of light river-valley mist, and the tufted royal palms stood motionless on its outskirts like ghosts of the Boriqueño Indian warriors that once stood watch over this charming valley.

The mayor certainly kept his promise to get us fifty-four patients who were really ill from anæmia. One of them died on the way in, and quite a number ought to have done so, but after hovering between life and death they were lugged back among the living by our superhuman efforts.

This activity on the part of the chief magistrate had the effect of greatly stimulating the curiosity of the *jíbaro*, and he on his part began sending in all of the gravely ill whom he could lay hands on. So before we could get organized, we were nearly overwhelmed by the awful situations which arise in connection with grave illness. The most serious matter was the purging of these people before and after giving them thymol, itself capable of acting as a poison. And it took a considerable amount of nerve, to say the least,

even to apply the remedy which was our only hope, and which expelled the worm.

From all over the enormous Municipality of 45,000 people, came trooping in men, women, and children in all stages of the disease, each carrying a matchbox containing a specimen of the *fæces*. After turning away a number of people without treatment because they did not bring this indispensable proof of the nature of their ailment, we had no more trouble, except now and then with pilgrims from far-away mountain fastnesses, who turned up without the indispensable proof and settled the matter among themselves by the simple expedient of borrowing.

But all was not so easy as this. We began hearing insistently that there was an element in the town which disapproved of a campaign that would exonerate the Colossus of the North from the charge of increasing the death rate from anæmia—a disease, according to them, caused by scarcity of food. Nor was it long, either, before we saw pretty strong evidences that some perfectly well-meaning people were trying to stop this campaign of ours, which they had been led to believe was based on pernicious doctrine.

One day, a beautiful Sabbath morning, bright and sunshiny—without the slightest warning, but with priest and red-robed altar-boys carrying crucifixes and burning candles—a chanting procession was seen to leave the church and to wend its way across the *batey* (clearing) facing which were our hospital tents. It happened that at that very time every single inmate was hovering between life and death, and so the excuse seemed good that extreme unction should be administered to them en masse. In fact, this was done; and it looked to us as though that night there would be a general exodus of the terror-stricken occupants.

But the sting of death was removed at the tail-end of

this dramatic scene by a bad-tempered, desperately sick old *jíbaro* by the name of Genaro, who, when the priest reached the front of his tent, sat bolt upright in bed and said: "*Tu eres un valiente sin vergüenza. Estás muy listo para espantarnos la salvación de la ciencia, pero no estabas tan listo para pedir con toda esta ceremonia la salvación de su alma para mi señora muriendo sin que yo hipotecaba la casa para pagarte. Quitate de aquí, y mal rayo te parte!*" ("You're a nice rascal. You're very quick to chase away the salvation that science offers us, but you were not so brisk about assuring the salvation of her soul with the ritual of the Church for my poor dying wife unless I promised to mortgage the house to pay you. So now you get out of here, and may an evil lightning split you!")

This remained a joke to be told to every patient who ever went to that hospital from that day on; and it was always richly enjoyed.

The other incident had more far-reaching consequences and was by no means so safe a proceeding. One sleepy hot afternoon, there stumbled up the winding staircase, in the line of sick, a white man with blue eyes and unkempt beard, barefooted and ragged. I happened to catch sight of him, and my attention was immediately arrested by those remarkable eyes. The attention of Joaquín was also arrested. Joaquín was a cheerful, good-hearted ne'er-do-well who had been cured in a spectacular manner and had emerged from a death-bed at the end of three weeks with a pretty healthy look and a devilish healthy appetite.

It did not take Joaquín long to come to where I sat at work and whisper: "Doctor, you'd better get that man out of here pretty quick. He's about the only real bad man we've got around here. He's killed his twenty men, and he's here for no good purpose."

"Well," I said to Joaquin, "he certainly has *la anæmia*."

"Yes, and I bet you it's the last thing he's thinking about," replied Joaquín.

Then my gorge rose. After all, I was young, and adventurous as most young men are. I told Joaquín to get me a glass of water, went over to the little room where the knock-kneed, skinny apothecary was dealing out thymol and salts from our prescriptions, asked him for a handful of thymol capsules, and said to Joaquín: "Tell that man to come here."

He came over. And, with the aid of Joaquín, I made use of an amusing little trick that we had in the Army. Both the man's hands were held powerless behind his back, while I "drenched" him just as we used to do to mules when they were sick at Fort Washington. I had never done anything so outrageous in my life before, and I know that no one had ever done anything so outrageous to him before. But down went the capsules.

By this time he was on the floor, and I was sitting on his chest; and from my point of vantage I said to him: "Over here we know everything, and we know why you came. Now get out, and never come back again unless you really and honestly feel that I am going to get you well. I promise you, however, that this is the only violence that I'll ever do you, unless you provoke me."

He went sullenly slouching away, and I saw him stick his finger down his throat in the courtyard below, but to no purpose.

From that time on, if I had been a nervous man, I might have been a little jumpy, for Joaquín never left me for a moment alone and begged me at least to get the fellow put in jail on some trumped-up charge, until I could get away from there.

He did return after all, about a month later, and he was a very different man. He had no beard, he had on shoes, and

he was fairly clean. But Joaquín knew him and instantly sprang to my side.

The man seemed normal enough. He came up in a very straightforward way and asked: "May I see you, sir, a moment—alone?"

"Certainly," I said, and saw Joaquín stiffen out like a tiger-cat at my answer.

There was a little dark-room nearby where we used to make haemoglobin estimations by the colour test to candle-light. I lit the one candle, and in he walked. Once inside, and the door closed, he said in quite good Spanish: "You may be surprised to see me again, and if you had not done what you did, I would have given you only one glimpse, and then you would never have seen anybody else. But I am a well man, and you have cured me, and now I want to know what you would like to have done to the man that sent me here."

I replied: "Well, I'm guessing. I don't ask you his name, because you wouldn't tell me. My answer you will probably not understand. I want him put out of the way—only I don't mean what you think I do. I want you to see to it that the man who sent you to stop this work is put out of a decent political party forever. I think I know who that man was without your telling me, and he knew that I was going to make good, and that in making good I would ruin him; and so he has gotten all of these poor misguided people to sneak around and do our campaign all the harm they dare. I've got your history, and I know that you have enough character to lick this fellow politically. People—these poor *jíbaros* with a vote—don't like you, but they're afraid of you, and they will do what you tell them to do. See to it that that man has no more to do with politics in Utuado."

I gave him some more medicine, to take home with him

this time; and it wasn't a week till I saw the effect of my conversation. There is no better people on earth than the people of Utuado, and with very few exceptions the selfsame people who had opposed our campaign fell in among the good ones. Moreover, our clinics swelled to proportions that frightened us. We had to start at day-break, work all day without lunch, until we could no longer see even with candlelight, and then had to turn away some who, rather than give up their place, slept on the ground till morning.

They came, of all ages from eight to eighty, not only from Utuado, but from Adjuntas and other adjoining municipalities, from the most unheard-of distances, over vile and sometimes dangerous trails, in sun and rain, up hill and down dale, looking for the doctors that cured by giving *purgantes*. We mounted from 300 a day to 600, to 900 and even, at times, to over a thousand, one day reaching twelve hundred and some patients, every one of whom had a faecal examination, a short talk on the evils of bare-footedness and earth pollution, and the "little glass balls" which did the magic. And yet there were those fifty-four hospital cases still on hand, upon whom daily blood-counts had to be made, histories taken, and treatment administered.

It was fortunate that there was only \$5,000. Had there been any more, there would not have remained one of the three original zealots to spend it. The Commission was in a state of exhaustion. But back it went to San Juan like a travelling circus (in fact, it was yclept by the son of the coffee plantation "*los caballitos*" which means the circus).

Encamped in the Bureau of Printing and Supplies, making firm friends of the entire printing force—who good-naturedly let it interfere with their work, because the crazy enthusiasm of its members was so unusual and fascinating—day by day the Commission laboured. The members even

accompanied their script to the pressroom and helped set type, corrected the queer outlandish English names, and urged these faithful men to their highest velocity. And so the first scientific study of hookworm disease in Puerto Rico, embracing 5,490 cases (instead of the promised five or six hundred), and a huge amount of blood data, symptomatology, prevention, and treatment, was ground out.

With the publication of this work terminated the very first campaign against the disease in the New World; and Puerto Rico had, with the American Army, made its first contribution to its new Patria.

PART Two
THE SECOND CAMPAIGN

Chapter V

I

FOR many years the anæmic people of Puerto Rico had been contributing heavily to unscrupulous vendors of medicines and blood restorers, and had reaped only a sad harvest of broken promises. Bottles of blood tonics at a dollar each were bought and religiously consumed throughout months by people who had not even enough to eat or to wear—bottles which cost ten or fifteen cents to manufacture, and which left the cause of the disease to work its will after a brief apparent betterment. The distrust of the populace for doctors of medicine had gradually become so marked that only the bedrabbled old *curandera*, or medicine-woman of the town, with her stringy hair and one remaining tooth, was held competent when it came to curing this terrible disease.

The story of the reconquest of Puerto Rico for science is one of the most thrilling to be found in the history of the Island. I shall always believe that the success of the first campaign against hookworm disease should be attributed to the conception, formed at the very beginning, of how best to interest the people in their own salvation. I maintained, from the outset, that even though the vast majority of our patients could not read and write, they and not the phrase-maker would best distribute our ideas.

By the close of that first campaign, some 5,000 people were spreading about in every direction the news that the anæmia of the Island was being cured for the first time in

the memory of man—was being cured by certain mysterious little glass balls, together with purges. The clamour that went up to continue this work was so formidable, especially from the Municipality of Utuado, led by the self-made political boss whose history has already been given, that gentlemen in frock coats who took no interest whatsoever in such things nervously consented to any proposition that would keep their constituents quiet and satisfied. Before we could even check on the activities of the Legislature, a bill had been passed appropriating \$50,000 for the fiscal year 1905-1906.

This too-rapid expansion would have menaced the success of our work for the coming year; and so it was necessary for the “inventor of the anæmia”—as I was called by a couple of wayworn pilgrims from a distant *barrio*, who sought me one day for professional advice—to hurry to the legislative halls and entreat the Lower House to cut the appropriation down to \$15,000. Even with that sum, we were hard put to it to prepare men capable of conducting an efficient campaign in untouched municipalities.

We opened sub-stations in a number of mountain towns, placed them in charge of competent and honest colleagues, whom we knew personally, and located our own headquarters in Aibonito. We kept up the work at Utuado, of course; but the departure of the original Three brought from that town remonstrances tinctured with hurt feelings, to which we replied with protestations of undying loyalty and affection.

The growth of our work at Aibonito was a repetition of our former experiences. First, there appeared at our clinic thirty or forty timid souls, pretty far advanced in their disease. Then came their sensational rapid improvement. In a month the station was running to



UTUADO ANAMEMI CAMP, 1904
The patients awaiting the doctor

capacity, and we were treating from six to eight hundred a day.

Although Aibonito is a town built, so to speak, on a point of exclamation, the name never was meant to describe the town: it was what some of the earliest Spaniards said when they peered over the edge of the mountain range into the lowlands of Ponce and out to the blue Caribbean Sea beyond. On entering the Aibonito of 1905, the wildest enthusiast would not have been moved to say: "Oh! How pretty!" (*Ay, bonito!*); for Aibonito in those days was a poem of "the shack with the galvanized roof," and there was not a tree in the place. Moreover, Aibonito had a flavour all its own, for it was a tobacco town and a local distributing centre for dried codfish. The water question was a serious one, also. Once, an effort was made to compound water for irrigation; but it is said that when the dam was opened to receive the water for storage, not a drop could be induced to trickle in, even when the band imported for the occasion played its liveliest airs.

Only one thing might be said in its favour: it is the most tranquil spot in the Island of Puerto Rico. There are residents of Aibonito who have travelled true enough, but the majority seldom stray far from the immediate precincts of their shacks. There still are citizens of Aibonito who know nothing of the great world, except that the Anæmia Commission once worked among them—and that in the period of 1905 to 1909, the Commission treated 8,598 out of a registered total of 8,596 inhabitants!

But we learned a great deal from this simple folk; and one of the chief lessons was that a wall-eyed, apparently indifferent population may be storing up an affectionate regard for their benefactors. While it is true that they did not fall on our necks with declarations of eternal affection, and that they received our advice and our medical alms in

silence—for they were a silent people—many an outsider found that it would not be safe to criticize the work of the Porto Rico Anemia Commission in Aibonito.

Little by little, from adroit questioning and observation, we acquired a fundamental knowledge of the character of the *jíbaro*. For instance, we found that in the rural towns of Puerto Rico a small coterie gathers in front of the drug-store in the cool air of starry nights. To this Athæneum repair the moulders of local opinion—the town doctor, the priest, the apothecary, and, above all, the militant political leader. In Aibonito, the whole group was overshadowed by the figure of one of the most delightful gentlemen it has ever been my privilege to meet, Don Federico Degetau, Resident Commissioner to Washington. Everything was discussed at those reunions, and everything was settled at them. Nothing was too small to be dealt with, and nothing was too large or indefinite to be handled with familiar ease.

But that drugstore forum in Aibonito was not the only centre of thought in the Municipality. Similar groups of men could be seen squatting in a circle in front of the country store in every far-away *barrio*. There it was that public opinion was formed.

Now it happened that during my sojourn in Aibonito I had to make one very hasty trip to San Juan—so hasty that it was made at night sitting beside the driver in a one-horse milk wagon, because there was no other conveyance available which would place me in the capital before the Legislature met. My pilgrimage was occasioned by the sudden and violent eruption of one of our most enthusiastic supporters. This patriot was proposing a law whereby every agricultural labourer would be required, before his day's work began, to dig a hole near his place of work as an improvised latrine. Foreseeing what a hullabaloo the

reform would cause, I expended all of my eloquence and tact to calm the sanitary frenzy of the statesman in question; and I offered to prove to him that even were real latrines constructed under mere legal persuasion, they would not be used.

To do this I returned to Aibonito, and soon thereafter set out on horseback for a distant *barrio*—a country precinct. When finally I stood before the community council in front of the country store, I announced that the Legislature had made a law requiring every home to be provided with a latrine; and I remarked to the so-called *alcalde*, or mayor, of the *barrio*: “My friend, you well know that you have never in your placid life done anything whatsoever to merit the high-sounding title you bear. Here is a chance to become famous.” And to the rest: “When I return and see every home provided with a latrine, I shall take extreme pleasure in making a special visit to the legislative wing of the Government and publicly announcing this to be the cleanest, safest, and most patriotic rural community in this beautiful Island.”

I returned about six weeks later, and found my *jíbaro alcalde* with the torn shirt and the bare feet at work in a tobacco patch.

“Good morning,” said I.

“Good morning,” said he.

“I came to see the latrines.”

“Yes,” said he.

“Yes?” said I.

“Yes,” said he.

“Do you mean to tell me that every man in this *barrio* has provided himself a latrine?”

“Yes,” said he.

“Show me your own,” said I.

Without a word he laid aside his machete and started

out for the bush, I following. We walked and we walked, and still we walked, until finally I struck, and said to him: "Where in the hell are we going?"

"You said you wanted to see my latrine," said he.

"So I did," said I.

"Well, I'm taking you there."

"Now look here, man," said I, "do you mean to tell me that you walk this distance every time you want to use a latrine—you, much less your wife and your children?"

"Why, of course not," said he. "The law requires us to have one, and there it is," proudly pointing to a rude structure of palm bark, "but neither my wife nor myself believe in these things, as they produce constipation. And besides, it's a nasty thing to have near a house. But the law requires it, and everybody else has one, too."

2

From what has gone before, it may be surmised that nine months is a fairly long residence in Aibonito. Our out-lying stations, however, were an inspiration to us. At Lares, we had a very forceful man, a political leader who was a physician, too, Dr. Francisco Sein; and he reported a total of 4,001 treated out of a population of 20,000. We had eight sub-stations in all; and the average cost per patient, including medicines, salaries to employees, and the cost of running a field hospital for sixty patients at Aibonito, plus the work of scientific investigation, was only fifty-seven cents. Our death rate was phenomenally low, only one in 300 patients; and the total number treated in the Aibonito station and the sub-stations was 18,865.

While in this year much more scientific work was done than in the preceding year back at Utuado, two specific accomplishments are outstanding: one, the determination

of the average number of worms harboured by a moderately or severely sick hookworm victim; the other, a careful study of the blood in these same cases.

We found the average number of worms harboured in seventy study-cases, under observation all the time in our field hospital, to be over a *thousand*. I suppose no one can possibly imagine what it means, after taking an exhaustive clinic and attending to 600 patients, to go into a stuffy little room without ventilation, dilute the seventy-two-hour fæces of half a dozen patients, roughly strain off the worst of the fæcal matter, and pick out and count minute worms as they slowly float down a small gutter painted black, into which they have been introduced little by little from a dipper. This two or three hours' labour day after day very nearly "got" King and me, and did get poor Gutiérrez, who there became infected with typhoid fever and almost died in the hospital in San Juan.

By making blood-counts on those seventy cases, it was possible accurately to match numbers of worms against blood values. And this we did all ourselves, besides running a similar series of urine examinations to determine the effect on the kidney of the various drugs we were using to expel the hookworm.

In addition, we performed thirteen formal autopsies which we managed to secure by much cajoling, if not actual chicanery, from the violently prejudiced *jíbaro*. In fact, one of those autopsies had to be done in a considerable hurry at the graveyard. All specimens (and there were a good many) removed from all the vital organs had to be put through the elaborate rigmarole that pathology then demanded to get reliable microscopic sections. One of the steps required twenty-four hours' washing of such specimens in flowing water. I can still remember the long line forming the bucket-squad, which reached to the roof of

our little roadside cement house where a barrel was placed for the reception of the precious liquid. Thence the water was piped off by rubber tubing into the room which by courtesy we called a laboratory, for the full accomplishment of these laws of the scientific Medes and Persians. It should be said that the bucket-squad was sublimely unconscious of the object to be attained and of the scenes being transacted in the smelly little room below. But some of those sections were so splendid that they are perfect in every detail to-day, nearly thirty years afterward.

Our *jíbaro* was pretty much the same old *jíbaro* whose acquaintance we had made in Utuado. He was blindly obedient, and every day he had to be told carefully every step of every chore he was called upon to do. At times his alacrity in obedience was embarrassing. On one occasion, when I had to get in touch with the owner of a far-distant plantation but had no time to go myself, I called a sprightly youth and asked him:

“*Ud. sabe donde vive Don Juan Pérez?*” (Do you know where Don Juan Pérez lives?)

“*Sí, señor.*”

“*Vaya a casa de Don Juan, y—*” (Go to Don Juan’s house, and—) Just then King interrupted me with a question, and when I raised my eyes, lo and behold! my messenger had disappeared.

Two days later he turned up again, footsore and weary, and, after contemplating the guinea-pig expression on his face, I said to him acidly: “Did you go to Don Juan?”

“*Sí, señor.*”

“And what did you tell Don Juan?”

“You didn’t tell me to tell him anything.”

But *jíbaros* are by no means like this always, as will be seen in the following case of one who, when given a dose of beta-naphthol to expel his worms, carefully explained

to his cured brother that the doctor had told him to give the medicine to him, the brother, to make sure of his cure.

Now in our examination of urine we had made a discovery whose only importance lay in the fact that it could be used as an unfailing device to catch people who said they had taken this medicine and had not. For at the end of six hours the beautiful diazo reaction appeared in the urine of the taker, and lasted only four hours. This occurred with no other drug. In making my rounds in the morning, I noted that this boy looked particularly lively for a youth who had just taken beta-naphthol, and so at noon I asked for a specimen of his urine. On examining it, the diazo reaction failed to appear, whereat I repaired to his tent again and asked him if he had taken his medicine. He replied that he had.

I then told him this (because all *jíbaros* have unbounded respect for magic): "My son, I not only know what I see you do, but I know what you do when I am away from here—*everything*. You did *not* take that medicine!" And my words carried conviction.

Just then, unfortunately for him, his brother chirped up and said: "But I took mine."

As I had ordered no medicine for him, I finished my sentence by adding, to the horror of the round-eyed *jíbaro*: "You gave that medicine to your brother!"

Although the boy never confessed, I was known thenceforth as an excellent doctor in all that countryside; for had I not proved myself a marvellous magician?

Aibonito, of course, is no longer the Aibonito of the Anæmia Commission. Around it have grown up the summer dwellings of the rich; and the *jíbaro* is no longer the *jíbaro* of those days—most unfortunately, we think. For to-day, although not yet wise, he is at least sophisticated, thanks to the American cinema and the Ford automobile.

When we of the Anæmia Commission departed, we left behind our young assistant, Dr. Canino. And he has been our sturdy representative there for twenty-eight years.

3

In commenting on these two years, which were the crucial ones in the campaign against hookworm disease (uncinariasis) in Puerto Rico, several things must be borne in mind. In the first place, we were attacking a strongly entrenched enemy, and this was front-line work. Our mission at the outset was to save life, not to work out a leisurely sanitary programme. Hookworm disease in Puerto Rico was pandemic—people were actually dying in large numbers from it. Moreover, the working class were really invalids. Though their efficiency was less than 50 per cent of what it should have been for men of their size and stature, it was they who had to perform the necessary labours of the Island.

There is no use to say that in the South of the United States the disease caused only laziness, and that, as a matter of fact, in hardly any place except Puerto Rico do people ever die of such a disease. Instead of 20 people to the square mile, as in the American South, we had 400 people to the square mile. The degree of intensity of the disease is based on the density of population plus, of course, the unsanitary habits and ignorance of the victims.

The denser the population the more chances there are for infestation, and the heavier are those infestations. The chances of infestation do not double where the population doubles, but become four times as great, and so on in proportion. At every polluted spot of earth the eggs hatch out nests of writhing worms ready to penetrate the skin of man. They rarely spread in a gradually widening periphery from such nests, but are carried to some other place

by heavy rains or on the feet of men and animals; and while it is true that usually in two or three months the infective larvæ die in the soil, it is also true that this loss is constantly and amply replenished by the infested.

That was why we took such care to find out what the average content of worms in the bowel of a Puerto Rican really was. Since a man with a hundred worms would never have more than a hundred until more entered his skin from the outside, such figures were unusually reliable as a measure of the intensity of hookworm infestation. It is probably true that with over a hundred worms a man will begin to show symptoms of the disease.

However, we had numerous instances of severe grades of hookworm disease in persons with even less than a hundred, and so there was evidently another factor to be considered. Nor was it long before we found out what that factor was: it was chronic malnutrition, or what we have chosen to call "nutritional unbalance." People had enough food to eat; in fact, they ate inordinate quantities of food. That part which was burned as coal for the engine they could get in plenty; but of the parts which replaced wornout portions in the human machine, there was not only a positive lack, but the people could be said to be on the very point of starvation for such vital elements, especially meat. The few worms simply dealt the final blow.

For the benefit of intelligent readers, both lay and professional, both here and abroad, we amply acknowledge the very important place taken by nutritional unbalance in producing the picture recognized all over Puerto Rico as *la anæmia*—or, in other words, hookworm disease. But the undeniable fact remains that this was not a nutritional, but a parasitic anæmia. That it was capable of cure and of prevention by specific drugs and the use of latrines, respec-

tively, is seen from the history of the sensational transformation of a helpless anæmic at death's door to a ruddy vigorous labourer, simply on the expulsion of these tiny worms, and without any alteration in his accustomed food. How, then, does the influence of poor diet come in? Thus: parasites plus poorly balanced food bring fatalities and serious grades of anæmia, which would not occur from parasites alone.

Now this we could not talk much about, although we knew it; because in Latin-American countries things have to be all one way or the other. It was either starvation, or it wasn't; it was either hookworm, or it wasn't. So for these first two years—in fact, during the whole campaign of seven years—the fight against hookworm was frontline; not sanitary work, nor an attempt to deal directly with the nutritional factor in the problem. In curing the huge number of 310,000 out of an estimated 600,000 that suffered from the disease, and in reaching nine-tenths of the serious cases at that, we were performing the sacred mission with which our great profession charges us: to save life and prevent suffering.

Not that we neglected sanitation and its bedfellow, personal hygiene, in this campaign. Every man, woman, and child who came in contact with us was told in simple words the nature of his affection and the means of preventing it, and the use of latrines was urged. But we had to leave to other hands, as a routine measure of public health in Puerto Rico, the task of rebuilding the devastated areas. We had also to leave the correction of glaring nutritional defects in the *jíbaro's* daily ration for that happier day when he could more or less choose his food. Even to-day his inadequate ration cannot be changed. He still lacks money to buy the obviously necessary elements of diet. But then it was war in which we were engaged. And

there was no time for much talk, and no money to spend save in destroying the enemy.

There is, however, a feature of our work that, while it has not been given due credit by the possessors of tabloid information on hookworm disease, was accepted as fundamental by the Rockefeller Foundation at the beginning of its campaign some years later. Namely, every soul treated was at worst merely one-tenth as dangerous a spreader of the disease as he had been before seeking treatment from us. Such a man would be, for instance, one who took but a dose or two of the specific medicine, felt well, and returned no more. The number of eggs in such a person failed thereafter to create the writhing nests which that man used to create every time he soiled the earth. And this is the answer to what seems to be the most justified criticism of our work.

As a matter of fact, that criticism was merely a specious one. In no country on earth can infestation be wiped out by treatment alone; but in every country where people generally take the treatment the back of the enemy is broken, and the picture of an invalid is replaced by an almost healthy labourer. Of course, after many years, it is conceivable that the numbers of the enemy may be built up by reinfestation. But it is certainly not the rule, for, from the day the Porto Rico Anemia Commission laid down its weapons and bade the Health Service take over the duty of continuing the campaign, hookworm as a disease has been responsible for very few deaths in this island, and the *jíbaro* has remained physically fit—at least, by comparison with what he was before.

Only, however, when the fundamental thing is done will the disease, as a disease, disappear from Puerto Rico. And that fundamental thing is the provision of better food for Puerto Ricans, and much more meat. It is, therefore, no

longer a medical problem, but a sociologic one of the very first water. It will be solved only by education, better wages, and the admission of cattle from surrounding islands and countries bordering on the Caribbean, which, because they have plenty of grazing land and a thinner population, can furnish this indispensable element of daily food to the residents of our tropical American island. It is futile to talk of bringing meat from the United States. The prices which such meats command are far beyond the means of the Puerto Rican labourer. Besides, he will eat only freshly killed meat.

Were Caribbean meats admitted here, it would be very easy to protect the United States against indirect invasion by animal diseases. A simple clause forbidding the exportation of livestock from Puerto Rico would protect the mainland. As to local protection, it is almost criminal, on this tiny, overpopulated island, to talk of protecting a few miserably inadequate cattle-raising concerns at the expense of a whole people.

It is my firm belief that we have gone now just as far as we can go in giving health to our tropical American citizens, until that next indispensable step has been taken which will free from chronic ill health not only the labourer, but also his more fortunate compatriot who lives on a higher scale. For, aside from the general effect of making a man less susceptible to the invasion of diseases in general, three great specific diseases will be literally wiped out by dietary reform: hookworm, sprue, and the nutritional anæmias. Thus might be ended a tragic story of human waste which has been going on now for over a hundred years.

Chapter VI

I

AFTER two years of our campaign, then, the first great objective had been carried. We had awakened the whole island to the fact that high mortality and progressive loss of strength and health among the populace were not visitations of God, were not caused by anything inherent in climate, but were consequences of a tangible disease, epidemic, and capable of being cured and prevented. That objective we had carried by centring the work in one place, by doing the work ourselves, and then gradually and cautiously extending our front by throwing out sub-stations in charge of men in whom we could trust.

But from now on, we saw, there must be a change. From this time forward the whole medical fraternity must be made participants; must feel responsible with us for a vigorous campaign which would present proof, on a scale never before attempted anywhere, that we were in the presence of a *curable* disease. We saw, too, that when the mortality should begin to fall and the labouring efficiency of the "pale man of the mountains" to rise, then an effort should be made to provide permanently for a service within sanitation which would forever meet just such emergencies; which would directly employ scientific medicine, the laboratory, and all of those modern weapons now utilized to stay the invasion of definite preventable diseases.

Clearly, the next step was to multiply by ten or twenty the stations for the treatment of anæmia. The faithful and

extraordinarily intelligent Gutiérrez, Puerto Rican member of the Commission, was solemnly charged by us with this tremendous responsibility, and he proved himself entirely worthy of that charge. Not that he did the work alone, of course; but by now there was no dearth of trained assistants. And so the real bulk of the total number treated during the seven years' life of the Porto Rico Anæmia Commission and its successor organizations was accomplished by Puerto Rican physicians.

Dr. Gutiérrez associated himself with two men peculiarly well fitted to support him: one, Dr. I. González Martínez, formerly Director of Laboratories of the Health Department—a man who had had the energy and aggressiveness to carry on by himself a sturdy campaign against uncinariasis and schistosomiasis, the latter of which he discovered here for the first time, in the western end of the Island; the other, Dr. Francisco Sein, whose achievement at our Lares substation already has been noted. Dr. King and myself were made honorary members; for the time had come for us to return to our Services for duty in the United States.

Before we left, we all talked over the plan of this work, which embraced: the teaching of the nature of hookworm disease and its prevention, throughout the public schools; the distribution of literature on the subject for the reading public; sanitary regulations compelling the use of privies; the exclusion from government employ of all carriers of the worm; and the rapid multiplication of stations for treatment all over the Island.

The new Commission now selected thirty-five physicians, and increased the number to forty-two the second year. Every man had a station of his own; and among them they covered the entire Island. By the end of its second year, the Commission had treated the unprecedented number of 170,000 patients, representing nearly a million visits to

the clinic-stations. The cost of curing each patient was about sixty-two cents. The death rate was only 0.21 of one per cent the first year; 0.12 of one per cent the second.

The reaction of the people of the Island to this lively and successful campaign was immediate, and was to be seen not only in the throngs seeking treatment, but also in the general voicing of satisfaction on the part of the communities affected. The war on hookworm became the topic of the day.

Thus in a trice the whole Island placed itself enthusiastically behind the movement, and both political parties united in the Legislature in sustaining the work with ample funds. From every quarter came eloquent testimony to the improvement in health of the agricultural labourer and to the considerable fall, generally not less than fifty per cent, in the municipal mortality. Indeed, a good many testified to a reduction in the expenditure for medicine over what had prevailed before.

No one laughed any more. There remained not one single voice to belittle or oppose the work.

On one occasion, when the Legislature had failed to pass the budget because of political difficulties not connected with the anæmia campaign, there arose such a general clamour all over the Island to continue the work that the Governor was actually obliged to call a special session for the consideration of two specific problems: one, the irrigation of coast sugar-lands; the other, the resumption of the work against the "anæmia of the Island." The bill embodying the latter project was passed without even a discussion.

The enthusiasm aroused by the stunning object lesson furnished by the Medical Sciences in these campaigns can be imagined when we reflect that the total deaths from anæmia had fallen from 11,875 in the year 1900-1901 to 1,758 in the year 1907-1908.

No sooner had I learned this and made it known in Washington, than back to the Island I came in 1908. (Poor King had been sent to Naples, and he couldn't come back.) The problem that now confronted us was to sustain a service which on the one hand would hold down the mortality and on the other would educate the people in avoiding the disease. For these purposes on November 1, 1908, the Anæmia Dispensary Service, successor to the Porto Rico Anæmia Commission, was created as a Bureau under the Director of Health. Naturally, Dr. Gutiérrez remained in charge of this service.

That there was still considerable need for a special service, may be seen by reference to the work of the Anæmia Dispensary during the year after its organization. Of the 54,725 persons treated, during 1909, in the fifty-nine stations throughout the Island, one-third were so seriously affected that they were classed as "intense" or "very intense" cases. This meant that about 18,000 persons were so ill that "they had arrived at that stage where a fatal termination might occur at any time," according to our own definition of such cases; and that they suffered from dropsical swellings, a ravenous and often perverted appetite (earth-eating, eating of feathers, chalk, cigar ashes—anything to permit them to be "scratched from within"). There was diarrhœa from suspension of digestion, and a fall in blood values to a point between 20% and 30% of normal.

In passing, let it be added that it is at this stage that the enlarged and flabby heart often begins to give way and dilates, with swelling of the feet and fainting spells. Extreme dizziness and noises in the head appear, and characteristic confusional states of mind, with headache and sleeplessness. At this period of development of the disease, also, begins the suppression of the genital function. The dilatation of the pupil which contributes to a sort of

stare is, of course, not peculiar to hookworm disease, but is simply one of the phenomena connected with an un-hinging of the function of the autonomic nervous system. The muscles are soft, flabby, sore, and extremely weak, almost simulating wet beriberi or even paralysis. Such people are always cold, and shiver in the shade of a tropical country if a breath of air strikes them.

A few of these medical details are thus given to try to reproduce the picture of that miserable physical state into which this subtle disease is capable of plunging a whole people. But the impression which was most lasting to the observer was the age of these hookworm victims, two-thirds of whom were in the very flower of their youth, between the ages of ten and thirty.

2

Only one year of this Anæmia Dispensary Service demonstrated to us that to continue it as such would be to lose time. We had treated in all nearly half of those suffering from hookworm disease on the Island. Naturally, serious cases could seldom now be found in the country districts. The spectre of yesterday had been whisked away from banana patch and coffee grove, and in his place a man had appeared. It was current observation everywhere that we had done away with the anæmia of the Island—an exaggeration fully justified, among these descendants of southern Spain, by the striking reduction in the number of anæmics that one met by the wayside, stumbling listlessly to their daily work. Our task was no longer to heap up case records but to erect a permanent institution for ready response to emergencies; and the necessity for its creation was as obvious as was that for the elaborate perfection of our weather bureau in Puerto Rico subse-

quent to the fearful hurricane of San Ciriaco. Hurricanes can't be stayed. But diseases, especially this disease, can be; and now the hour had come for us to inaugurate the Tropical and Transmissible Diseases Service. Dr. Gutiérrez began to work out the details.

The mighty strides being made by medicine to-day are nowhere better illustrated than in the metamorphosis of a good old country practitioner with a flair for politics, who used quarantine and some evil-smelling disinfectants as his only weapons against epidemics, into a modern sanitary officer. What has happened in the Army to make a doctor into a combatant military officer of as much value as any other officer in winning battles, has happened also to the doctor in a progressive community in times of peace. When medicine, with its microscope, chemistry, mathematics, and knowledge of minute animal and vegetable carriers and distributors of disease, became a science, there came a demand for men educated especially for the administration of health. Doctor of Public Health is a title now given by our universities to men who have to make up their mind to be contented with but one client—the Government. Such a specialist, on taking this degree, takes on a sort of Holy Orders. He has no business practising medicine. His job is to *prevent disease*.

Unfortunately, however, politics cannot get the image of the complacent old practitioner of years ago out of its head, and still demands fealty and obedience from his successor. Until we immunize Public Health against politics, we shall never succeed in giving our people their full rights as citizens. This is especially true in these tropics, where by race and climate the full meaning of liberty still is not fully appreciated; where the chains of feudalism still are dragged, rusty and here and there broken though they be; where the Inquisition, long since fallen into desuetude in

the land of its birth, still flourishes in the shape of malicious gossip and the presumption of unproven intentions. The building up of a strong sanitary service, based on scientific reasoning and not on party prejudices and vain imaginings, is here the most urgent of civic problems.

Imbued now with a broader, more reasonable view of the administration of Public Health, we saw that henceforth there were two elements to be considered: the Law and Science. A mere head in San Juan, which, like Alice's Cheshire Cat, had no claws to scratch Ponce, no tail to wave over Cabo Rojo, was not enough. The dictum from the throne was only as the rumble of distant thunder. It was science that had to be on the spot to demonstrate, to teach, and to gather for the Department of Public Health recruits for the army of common sense which was to be back of the law. To that end, on our advice the Legislature created a Bureau of Tropical and Transmissible Diseases, headed by Dr. Gutiérrez, and equipped a laboratory centre in every one of the seven Senatorial Districts of the Island. Every centre was presided over by a modern physician, a scientific sanitarian; and there the nature of disease could be proven and the people gradually be taught to reason from cause to effect. This representative of Sanitation at each one of these centres was not affiliated with any political party, was not beholden to any of them for his position. He was chosen by competitive examination and could not be removed save for malfeasance in office or proven incompetence. He could have sub-stations for the treatment of hookworm disease, malaria, tuberculosis, or any other communicable disease affecting the health of the people. The law still emanated from San Juan alone; but the authority of science was everywhere.

See to what we had brought our campaign against "anæmia" in Puerto Rico! We had demonstrated to an un-

believing, often scoffing, population that it was a communicable, curable, and preventable disease. We had convinced them. And now, for the future, we were building educational centres served by men whose capacity had been demonstrated and whose interest was solely in the practical ends to be attained: to show the people how to avoid death from preventable illnesses *of all sorts*. The success of the Bureau was immediate; and so, jubilant, Dr. Gutiérrez presided over it for two years.

But all of a sudden the basic law of Sanitation was changed and centralized in one man, the Commissioner of Public Health. In a trice, this splendid service was swept away; and the men who gave their best years to that ideal still are mourning the unpardonable legislative theft of their life-work.

Nevertheless, the memories of an efficient sanitary service still linger in the Island. Thanks to those memories, the "Health Unit" of the present régime has gained popular acceptance. Under whatsoever name this organization may function, it is destined one day to free the Department of Public Health itself from politics; for the time is coming when its chiefs will be obtained by competitive examination. And when that day dawns, let it be remembered that this independence came through the labours of those who formed the first Porto Rico Anæmia Commission.

During the seven years' work begun in 1904 and ended in 1911, 310,000 people were treated successfully for their disease and only about one in a thousand died. This was done at an expense of only 68 cents per person, and represented 1,600,000 visits over mountain trails and hot coast-lands to see the doctor. Similar treatment has never been accomplished anywhere so cheaply; and this record constitutes, with all of its manifold details, one of the most remarkable campaigns ever undertaken against disease since

the beginning of time. Of it a faithful little country doctor far back in the mountains of Puerto Rico has written sententiously:

“The most beautiful, the most tremendous, and most meritorious work ever undertaken in behalf of the peasant of Puerto Rico has been the campaign liberated to free him of the anæmia that threatened his existence—the best spent money ever voted by the Legislature of the Island.”

3

It is fortunate that, right at the conclusion of our seven-year campaign, in 1911, I bethought myself of the value direct testimony would have in substantiation, for the lay public, of scientific reasoning. The benumbed *jíbaro*, just stretching his limbs from his sleep of centuries, had not yet collected his thoughts sufficiently to relate what had happened to him. It was to the planter, the man who had had to depend upon the victim of the hookworm to work out a balance favourable to himself, that we would have to apply for a corroboration of our scientific facts.

My colleagues of the Commission thought—and with reason—that I had little to hope from the planter in this regard; for here, as in other agricultural countries, there were two distinct categories of proprietors.

In one was the small landholder whose intellectual development was little better than that of his peons, and who was, with honourable exceptions, unfitted to express himself clearly on such subjects as those I wished to discuss. Such men were excellent citizens in a restricted sense, but they were a silent lot and would always rather say indifferently that the result of the campaign was “acceptable” than go on record that “this work has been the salvation of my business, for it has converted my labourers

into an asset where before they were a liability." Besides, many of these poor chaps did not know what percentage meant, and so could not answer the questions propounded.

In the other category, however, was the educated country squire; the very cream of Puerto Rican citizenry, clear of expression and free of exaggeration, with an intelligent sympathy for the country folk who practically formed his family. In both categories absolute honesty prevailed, together with an intense longing to better the condition of the labourer. For proof, I need but point to the fact that over half of these planters were paying a wage to invalids, whose living expenses they were sustaining out of human pity and without hope of return. In numerous cases, the planter was wittingly conducting his business at a loss so ruinous as to threaten him with foreclosure—for mortgages lay heavily on almost all of these plantations.

Now right here was what my colleagues had failed to see, i.e., that the genuine concern of the planter for the welfare of the peon might be used as a prod with which to provoke an outburst of popular enthusiasm. Men who could not concentrate results to a percentage basis were nevertheless astoundingly eloquent when they came to express in a few words their sincere admiration of what Medical Science had done for them and their beloved *jíbaros*.

I had four hundred circular letters written, and sent them to those employing the most labourers on their estates. I asked five definite questions and requested a general statement at the end as to the efficacy of the campaign. Answers were received to 58% of the letters. One has only to read over those replies, in order to see whence came our recompense for our tremendous personal effort. Scientifically, the most interesting information furnished by the composite answer of 201 planters was this: that they

estimated the gain in efficiency of their labourers, after the treatment for anæmia, at 61%—a figure which jibes almost exactly with the gain in haemoglobin, or blood-colouring matter, determined by instruments.

From the other composite answers, we gleaned the information that only 42% of their labourers had been able to earn their wage in 1900; that now (1911) 18% of their labourers remained to be treated; that by curing the anæmia of these labourers they estimated their profits would rise 40%; and, lastly, that the assertion that peons, on being cured, deserted the coffee plantations for the more remunerative cane-fields, was false.

Only two instances will be cited, from letters received in those days, to demonstrate the dreadful conditions which prevailed in the Island of Puerto Rico just before this work was undertaken. The old doctor who for thirty-two years had been practising in the Municipality of Adjuntas—the word municipality in the Spanish language covers all of the outlying country district surrounding a town—stated that for the first two years following the hurricane of San Ciriaco, out of a total population of 18,000, sixteen hundred had died of anæmia, against an average of 375 deaths from all other causes for preceding years. He goes on to say, however, that when he became convinced that this anæmia could be cured by methods proposed by me, in the last four years he had treated 8,000 cases of the disease with only twelve deaths.

The other reference is quoted from a planter writing me from Aguadilla: "I have observed that some of our peasants at a certain period of the year were left completely without support, for this terrible disease prevented their working, and they had to beg in order to live. To-day, however, after cure of their anæmia, they own something—a little

business, a cow, a nice little house, and, in addition, subsist happily and work constantly."

I have an enormous scrapbook stuffed with such letters; and anyone with a little imagination—or even without it, but with a human heart—can read page after page to stir him to deepest pity and regret that such privation could have prevailed in the "Rich Port," simply for lack of a few cents' worth of medicine and a pair of shoes.

To-day, through the piling up of our data about hook-worm disease—"sleeping sickness" would be a better name for it—we are enabled to comprehend why the *jíbaro* is so ignorant of the world about him, why he is so gullible, so lacking in initiative, so dependent on others. His history is plain. His world became smaller and smaller until it was limited to the confines of his plantation, because his physical forces were too depleted to carry him out into the world which, small as it is, is Puerto Rico. Yet this is the man of whom we have to make a citizen, a man with a vote and a say in the affairs of the Island. His has been the awakening of Rip Van Winkle, and he has awakened into a world which leaves him gasping, stunned. He is neither a degenerate nor a fool. He is a man deserving of our warmest pity and of our most merciful treatment.

Chapter VII

I

THE United States was slow in responding to the discovery of the cause of the pandemic which raged in her closely outlying American possession. That discovery, as has been said, was first brought to the attention of American scientists in the article published by me in the *New York Medical Journal* of April 14, 1900. Yet, with every reason to suspect that in our Southern States there was also a pandemic, attenuated but similar to that in Puerto Rico—and more particularly, since my paper was followed the next year by a case reported from Virginia and others from Texas—it was only in 1902 that Dr. Charles Wardell Stiles demonstrated the extensive distribution of the hookworm within our continental limits. And, at that, it was really more a natural deduction than a discovery.

But unfortunately our daily papers, avid of news that would stimulate the jaded American palate, suddenly announced that Dr. Stiles' demonstration of the worm in the Southern States was a *discovery* not only of world-wide significance, but, by insinuation, one of startling novelty—this, too, in face of the fact that hookworm disease had been known to have caused the anæmia of the St. Gotthard tunnel workers in the early 80's of the past century; and that several European countries, notably Germany, France and Belgium, had been combating it since that time in their mines and brickyards.

Moreover, the newspapers featured hookworm as the new-found cause of the laziness of the Southern "po' white trash." This latter statement produced a violent reaction throughout the South. From all sides came the liveliest protests that it was outrageous to use a definite debilitating disease as an excuse to aver publicly that Southerners were lazy, thus deliberately confusing the illness and weakness of these poor people with a moral defect. In fact, for several years the newspapers furnished America with a cheap laugh over the "germ of laziness," and over the "lazy disease," as it was popularly called from coast to coast.

Incidentally, two of the pictures covering a full page to illustrate these fantastic articles happened to be my own. The first, which I had taken myself, showed one of my patients being carried in a hammock from the clinic in Utuado to our field hospital. It was labelled "Carrying an Anæmic from the Fields of Georgia to the Hospital."¹ The other picture, now famous, was the photograph of a microscopic section of the worm with its head buried in the mucous membrane of the intestinal canal; and it, too, was very much my own, as Dr. Gray of the Army Medical Museum had cut and stained the specimen especially for me while I was in Washington. Not only were those two pictures never sent to anyone for publication, but the negatives were in my possession; so that the only way they could have reached the hands of the newspapers must have been through someone with whom I was communicating by letter at the time.

Furthermore, Dr. Stiles made the mistake of supposing that I had been prepared to look for this worm from his lectures at Georgetown Medical School when I was his student in Washington. He stated that he had emphasized

¹ This picture is reproduced at the top of the illustration facing page 68.

the prophecy that hookworm would be found in American territory in connection with a clinical picture similar to that which I had encountered. But I have already recounted how I was directed to examine the fæces of my first patient. Indeed, for that matter, as far back as 1881 Hirsh, author of a reference book on medical geography much used in Europe, had insisted that, from clinical histories published by American physicians, hookworm must exist in the United States.

My intention in taking my worms to Stiles in January of 1900 was, as I told Albert Hassall, his assistant, to give Stiles a chance to cover the parasitological aspect of the question. And my intention in mentioning his familiarity with the Old World worm in my first article was simply to show that my University professors knew their subject matter. I presumed that he knew the hookworm as Europeans did. I did not say that this had anything to do with my finding the worm, or even with my looking for it. That this worm in which I discovered no teeth turned out to be a new species (*Necator americanus*) had absolutely no practical bearing on the disease; for the new species causes precisely the same set of symptoms and is treated in precisely the same way as the *Ancylostoma duodenale*, or Old World species.

So there was no connection whatsoever between the discovery of hookworm disease in Puerto Rico and Dr. Stiles.

On the other hand, the discovery of the disease in Puerto Rico had a great deal to do, if it did not have all to do, with the discovery of hookworm disease in the Southern States. Many factors contributed to arousing the interest of physician and layman thoroughly: Dr. Stiles himself, the sensational daily press, Ambassador Walter Hines Page, and, finally, Mr. John D. Rockefeller. For it seems that Dr. Stiles gave Mr. Page much of the data for his presen-

tation of the South's problem to Mr. Rockefeller—a presentation which ended in a world-wide campaign undertaken at the expense of that philanthropist.

“Discoveries” in medicine would generally better be termed “steps” in the evolution of our knowledge; for the golden thread passes through many hands before it loses itself in a misty past. But one fact was truly discovered in Puerto Rico, and in Puerto Rico only: hookworm as a scourge of the agricultural labourer in tropical and sub-tropical countries could be successfully treated and exterminated in a comparatively short period of time. This practical find completely revolutionized the treatment of the problem, and Puerto Rico furnished the first solution in the world through its Porto Rico Anæmia Commission and their seven years’ labour.

When the matter reached Mr. Rockefeller, the great capitalist, now anxious to practise philanthropy on a large scale, saw in this his best opportunity. He called in Dr. Wickliffe Rose of Nashville, President of the University of Tennessee, and stated that he was going to make him the Director of a charitable institution whose bills Rockefeller proposed to settle, known as the Rockefeller Sanitary Commission. As a first move, he sent him direct to Puerto Rico, to meet me and verify personally all that had been published and all that Stiles had reported, to observe closely the working out of our campaign against hookworm disease, and to return and report his impressions.

Dr. Rose reached Puerto Rico in 1908, shortly after I had returned to the Island for the third time and had made contact with my old Commission, then just turning into the last lap of its tremendous campaign for health, with 59 stations working and some 250,000 people treated successfully. I did not give Dr. Rose a lot of literature and a lot of talk. Instead, we donned riding breeches and boots,

and, accompanied by Dr. Gutiérrez, rode and rode and rode on horseback all over Puerto Rico, never by highway, always by trail, eating here and sleeping there in country homes where I was known and welcome.

Rose saw the poor mud-stained labourer degraded by his disease and literally submerged in the monotonous routine of coffee culture, living from hand to mouth; his children starving and sick; and his wife, no better off than he, working a bit in the coffee grove and a listless bit more in the bare shack. He saw the exquisite beauty of these tropical mountains with their sheer ravines and their limpid streams. He felt the cool damp of the coffee grove under the feathery shade of the *guava* tree. He talked with the plantation owner and found that only a tithe of his workmen were worth their salt, and that they were held on as labourers—with a wage pitifully low, it is true—because the owner hadn't the heart to turn his half-starved people off, sick as they were. He personally verified their ragged clothes, their lack of shoes, and their docile, animal-like constancy in the work of the *amo*, or master. He talked with the *jíbaro* and found a man who had descended almost if not quite to the level of the beasts, stumbling about by day over the slippery mud of the coffee plantation, sleeping cold and wet at night without bed or bed covering, eating what he could get—a fare limited principally to a mess of rice and beans, with codfish and tubers—and procreating, with no thought of the morrow, no thought of the hereafter, no thought of the future of his sons and daughters, not even a thought of a freer, better life; only a monotonous repetition of to-day, yesterday, and of the other yesterdays before it.

Then he heard the talk about the new-found cure for these sick people. He heard them discuss the long trail over which they had to slip and slide, in order to see the

doctor at the anæmia station and to get two packages of salts and a dozen or so capsules of thymol, considered by the *jíbaro* to be little glass balls rendered inoffensive in some way by the doctor's magic. He saw how that man literally blossomed in health under the crude, harsh treatment. He saw pink cheeks replace sickly pumpkin yellow, glossy hair replace dry lifeless locks, a light come into eyes that were glassy and dead, strength come into nerveless arms that before worked because they had to, but now worked for the love of it. He listened with pleasure to *giúcharo* and heard the guitar begin to twang where before all had been sad silence; and he drew the conclusion that if money could buy all this, it would be money well spent.

Dr. Rose left Puerto Rico a changed man, fired by new ambition and a new mission, and he left behind him one who thenceforth was among his most intimate friends.

After he had reached home, it did not take long to organize the Rockefeller Sanitary Commission for work in the South on exactly the same lines as those laid down for Puerto Rico. And after phenomenal success and a firing of other souls in the South by the same divine touch, it did not take long for the Rockefeller Sanitary Commission to become the International Health Commission. And, apparently, it did not take long for the fathers and the great philanthropic sponsor of that work in the United States—who had not dreamed the dreams that Dr. Rose had dreamed in Puerto Rico in the cool night air of the mountains—who had not seen the sights that Dr. Rose had seen in the drenching rain of the coffee grove and the bare huts of the poor—to forget the sources from which had come the working-plan that eventually made the Rockefeller Foundation a household word in medical philanthropy all over the world.

The Porto Rico Anæmia Commission, however, never

forgot its rightful place in all of this remarkable mosaic. It had mothered this sturdy chap; and now that the sturdy chap had become internationally great, it retained its independence, paid its own bills, and kept on until it had finished its labours in 1911, when it quietly withdrew, turning over to the Insular Health Department the most perfect-working and beautiful sanitary machine this Island has ever seen. Unfortunately, as has been suggested, from that time on the machine began to disintegrate. Heretofore it had taken the undivided time and attention of three men whose life-work it was. Now it was merely an added charge to an already overloaded Commissioner of Health, who found himself sole head of everything, and who could with difficulty find a few hours to leave his desk for an occasional visit to some one of his dependencies throughout the Island.

In the meantime, the original members of the Porto Rico Anæmia Commission had formed their Institute of Tropical Medicine and Hygiene—how they did it will be recounted later—and were spinning along on their own road toward a new goal.

2

In 1913, the Commissioner of Health for the Island of Puerto Rico paid a visit to the newly founded Institute. In passing, he remarked that he had found the matter of treatment of anæmia on the Island rather more of a fad than anything else. He had put one of his most valuable men at Utuado, our old station, where we had treated 4,500 patients in three months; and that man, working continuously for a year, had barely reached a thousand. "Which means to me," said the Commissioner, "that the novelty of this thing has worn off."

Had this been a bugle call for a cavalry charge, it would

not have had a more galvanizing effect on us. "It's not so!" we indignantly replied. "Let us fellows take that station, and we'll show you whether people have become tired of getting well or not."

The challenge was too direct to be disregarded, and the Commissioner of Health took up the glove of the Institute. "All right, I'll put you in charge of it."

"But," we said, "we have conditions. We want four strapping young doctors. We want all the medicine we shall need. And, above all, we want it understood that if we save the situation for you, the credit is ours; for this Institute is a baby and needs to live on something. If this is to be its first field work, it has to get the credit for it."

The conditions were accepted, and both the Institute and the Commissioner of Health prepared for their joint labour. I had a long talk with my comrades of the Institute, Gutiérrez and González—and King, who at our request had given up his beautiful station in Naples and come back to slave with us because we needed him. We all declared that we would stand together till the last ditch.

We closed shop and prepared once again for a long siege in the mountains of Utuado. There we hired the sugar estate of Don "Flores" Muñoz, a picturesque old creole mansion with rambling wide balconies and a glorious view of the great river valley flanked by wooded mountains. It was a real country-seat of the old days, with its *batey* and its quarters for servants, and was elevated on a little knoll to allow the free sweep of breezes in all directions. About two miles distant was the town. We had three young assistants loaned by the Commissioner of Health for the Anæmia Dispensary Service, one nurse, and plenty of servants recruited in the neighbourhood. This was to be the very perfection of field dispensaries for the treatment of hookworm disease.

DR ASHFORD TAKING A BLOOD SPECIMEN FROM AN ANAEMIC BOY (1904)



Every detail in our working-plan and equipment was the fruit of practical experience over many years. In method, however, we intended this expedition to be a new departure: to combine treatment with investigation. The object was to make a cross-section of the diseases prevalent in the mountainous interior—of conditions sociologic and psychologic, as well as economic, for that district. To that end we divided our forces. All patients were required to come prepared with a specimen of fæces, and first examinations were made at microscope tables under the covered way in front of the entrance to the building. A short clinical history of every patient was entered on a card, together with the results of the microscopic examination, whether positive or negative, for hookworm. If any other disease or any surgical condition existed apart from hookworm disease, then the patient was sent inside the house and passed through the hands of the four of us, who had divided ourselves into examiners in internal medicine, surgery, gynecology, and skin and other appendages.

In short, people were invited to that clinic for diagnosis and treatment for whatsoever disease or injury they might have.

From the very first, the whole Municipality of Utuado, as rapidly as possible, seemed to be emptied in front of us. These people had known us of yore. We were their old doctors, and this was just what they had been waiting for. Sanitation had promised to keep us fully supplied with the specific drugs for the treatment of hookworm. But the first shipment, measured by the timid doubt of the Commissioner's supply officer, was swallowed up in ten days' vigorous work.

Once more, the nights at our country seat well repaid us for the weary days spent in drudgery. Only military men, or men who have formed a part of such an expedition as

this, can appreciate the communion of spirit which enters into these camping trips. By mutual confidences and the recounting of the day's experiences, with its multiplicity of queer medical problems and still queerer psychological ones, we lived intensely the life of improvised medicine in the country.

Conditions were pretty primitive, once outside the limits of Utuado. On one occasion I had to go into town for some drugs for which I could not send, as a selection had to be made. On entering the town a bridge crossed the same river which we had to ford with our horses at another bend a mile or so up the road. When I reached that point, which was the western limit of Utuado, I noticed a gathering of people, most of them on horseback, and mostly males.

It seemed that this was the funeral of the mother-in-law of the man who owned the country store on the very edge of town. There at the junction of the roads, one leading to Arecibo, the other to Utuado, was the coffin, of pine wood covered with glazed paper of celestial blue, with a red, green, and purple bird on each corner, and various other decorations of a conventional sort generously bestowed here and there. The owner of the store and ex-owner of the mother-in-law delivered a short funeral address, and then brought out eight bottles of rum, giving one to each of the eight pall-bearers, who worked by fours.

The mother-in-law had lived on the wrong side of a rather distant mountain *barrio*, and by the terms of the law had to be buried in a certain far-off burying-place. The four stalwart lads who acted as the first relay of pall-bearers took a concerted pull out of their rum-bottles. Then, after blinking away the tears which the rum had started in their eyes, they spat on their hands, cheerfully grasped the coffin, and started off at anything but a funeral

pace, the other four following to relieve the front line when the front line got tired.

Several days later I was moved to ask if they had got back all right. The bereaved son-in-law gave a mysterious look around, and then whispered hoarsely: "Yes, they got back all right. But you know, doctor, where the road crosses the river?"

"Yes," said I, not dreaming what was coming.

"Well," said he, "not that I blame them, because she was a heavy old brute, but they decided that it wasn't right to make them walk so far, and that's as far as they went."

"But," said I, "what did they do with the deceased?"

"Oh," he said, "I ought not to have given them that rum. They dumped her in the river!"

About two weeks after we began work, the Commissioner of Health passed the night with us, and spent a half-hour watching the next day's clinic. More encouraging, however, was a visit from an old and very dear friend and a coterie of his admirers—no less a person than the universally adored Puerto Rican patriot, Luis Muñoz Rivera. Here was a man who went to the bottom of things and in a flash saw not only what lay before his eyes, but what it meant for the future. He was grave, kind, and intensely interested and curious. He asked a thousand questions of us and our patients. He went through our modest hospital with its thirty-some beds; and by the time he left he had seen what we were contending with. The next week his newspaper and the illustrated weekly of the Island, *Puerto Rico Ilustrado*, came out with one of Muñoz's best descriptive efforts (unsigned) and one of his best analyses of his people and their needs.

As a result of this medical raid, the Institute of Tropical Medicine of Porto Rico, manned by the inseparable Four, turned in (1) a report of 10,141 persons treated for hook-

worm disease in sixty working days, and (2) a medical survey of 1,982 persons with other disease conditions. Thus was made, so far as I know, the first medical cross-section, or, as they call it nowadays, medical survey, of a rural community in Puerto Rico.

From that time on we turned our faces resolutely away from the problem which had been nearest our hearts for fourteen years, and set out on diverging roads, each quite alone: King to study tropical diseases of the skin; Gutiérrez, as Director of the Institute, malaria; González, certain refinements of roentgenology, or X-ray; and I over the broad trackless desert of sprue.

Meanwhile, the Rockefeller Foundation has gone on mounting, mounting, mounting its enormous tower of human lives saved from hookworm disease. By this time no part of the earth remains uninvestigated, and new remedies have been found and tried and finally adopted in preference to the old weapon, thymol. But, so far as I am concerned, I can see no valid reason for changing our ammunition. We had no deaths from thymol, and to its use our people are accustomed. A protracted following of one course of treatment only brings more familiarity with our patient and his problem. And he, on his part, is thereby brought to look upon his doctor as a physician, not as a distributor of some modern sure-cure drops. Of these last it is true to say that occasionally—and more often here, perhaps, where the liver is apt to be shrunken and of imperfect function—they do mysteriously kill not only parasite but patient.

Chapter VIII

1

BUT I have been neglecting the account of my personal fortunes. When the great dream of freeing Puerto Rico of its anæmia finally had been placed on a working basis, service conditions required my presence and active participation in the Army. Accordingly, I was relieved from duty in Puerto Rico and ordered to Washington Barracks, there to become the Medical Officer of the Battalion of Engineers. In July, 1906, I reported for duty to the battalion commander of what was generally considered to be the choicest post in the Army of the United States; for the barracks nestled up against the Capitol and the White House, and were in full touch with all the delightful gossip and intrigue of official circles.

I very soon found myself in the sumptuous office of the Surgeon-General of the Army, who was one of the most charming and cultured men whom our Corps has ever been privileged to recognize as its Chief.

General O'Reilly was not only an excellent administrator, the very embodiment of a high-ranking military officer, but at heart he was also a great physician, possessed of the philosophy of medicine. There was another quality, too, which bound the General in affection to every member of his Corps: he was a father to us all, and his pride in us was unlimited. While an excellent disciplinarian, discipline meant for him the formation of a loyal family with eyes fixed always on the stars of their idealism, but with feet

firmly on the earth. His first words to me were typical:

"I have brought you back not because you have not done well where you are, but because I have ambitions for you and your future, and I do not want you to get to be one-sided. I want you deliberately to learn to become a surgeon, to leave medicine and scientific investigation for a while. And I want you to become a military officer. We are called upon to apply our great profession to the purposes of war, to help win battles. And to do that one must learn how to control men. You will have no easy task in following out, as I wish you to, the plan I have drawn up for you. You will be the chief Medical Officer of the garrison, and thus yourself will be subject to military discipline; but you will also be in command of the company of two hundred soldiers of the Medical Department, training for war. You will be a Company Commander, and your duties will be those of a military officer. I have provided independent barracks for your men, and anything I can help you do to make Company C of the Medical Department a rattling success, you can always count on me to do."

That was all. He had no time to say more, and I had not the nerve to enter into familiar conversation with the Big Chief. What followed, however, surpassed even his expectations.

The lambs which I had been called upon to convert into soldiers of the United States Army were, most of them, recruited from the streets of our great cities. But drills and drills and still more drills, regular hours, good food, and a little dash now and then of military display—such as parades in which they were pitted against the soldiers of the Engineer Corps, and of the Infantry, Artillery, and Cavalry—aroused in them a spirit of emulation which made those rival organizations green with envy. For

we had a fine-looking body of upstanding young men. It is true that they sold their overcoats for more than they had paid for them. It is also true that they set fire to their barracks. And, worst of all, it is true that they boasted and swaggered to the extreme displeasure of their uncomfortably close neighbours, the men of the Engineer Battalion. But the simplicity and rigour of military life made those men into fine specimens of the regular soldier. I had my own way of punishing them without breaking their pride. As they put it: "You won't have to go before a court—he has a little hell of his own." And I had marvellous lieutenants who kept them snappy and respectful.

In addition to all of this military routine and display, the men were given intensive training in first aid to the injured and in their duties as representatives of Medical Science in time of war. The things they learned were practical things. They could apply an improvised splint to a broken leg; they could stop a haemorrhage; they could write a log of the progress of a sick or wounded man. They could improvise all sorts of apparatus to make wounded men comfortable until the doctor arrived. They were made to feel, moreover, that the man hurt in battle was to be treated in a military manner—without unnecessary steps, with promptness and efficiency—to the end not only that a life might be saved, *but also that this man should be returned as a soldier to the line as soon as possible.*

Before long, enthusiasm for our particular branch of the service became intense. The soldier of the line stopped sneering at the "pot-wrestler," the "bed-pan soldier." And in the end, soldiers of the line were scrabbling to get into our company.

Then came another phase of my own development. I was made first assistant to the Surgeon-in-Chief of the General Hospital at Washington Barracks, which was the

forerunner of the Walter Reed General Hospital. It was presided over by one of our greatest surgeons, Major William Borden.

Under his tutelage I became a surgeon.

At this time, also, the duties of Surgeon to the Battalion of Engineers provided me with professional experience in a third direction. Before I became Company Commander, and at the very outset of my service at Washington Barracks, my duties brought me into an almost familial relationship with the Engineers. As everyone knows, the yearly increment of officers for the Engineer Corps is recruited from the honour men at West Point. It is, therefore, an exceedingly intellectual Corps, composed of well-bred men, the élite of the American officer class. Immediately, Ulysses Grant III became my closest friend, and where one was found the other was not far away. Moreover, for all of the enlisted men, I was their own personal doctor; and all the little secrets and tragedies of the old non-commissioned officers, living with their families at this post, became interwoven with that delightful association which an officer has with his men.

It was not always easy, however, to make my scientific zeal jibe with the strict routine of military procedure. On one occasion, the Battalion was ordered to the big National Guard Encampment at Mt. Gretna, a beautiful spot in the Alleghanies, with fine lakes, streams, woods, and wild flowers. As we stepped off the train, I remarked to Major Langfitt, the Commanding Officer: "Major, you had better make our men boil their water until we know whether it is safe. They tell me there is a lot of typhoid around here."

I was interrupted by a ferocious-looking, bald-headed man in civilian clothes, who seemed to know Major Langfitt. "You don't have to do any such damn foolishness,"

he declared. "I've been here for three days drinking this water, and nothing's happened to me."

I turned on him instanter, and said: "I don't see what in the hell you've got to do with this Battalion. I'm the Surgeon here, and I would thank you to keep your nonsensical ideas on hygiene to yourself and not try to get Major Langfitt to risk the lives of innocent men just because you didn't get sick when you drank this water for three days."

With that, the fat man nearly blew up. "I am Major —, Inspector-General," said he. There was a tableau, of course; but I was hot-headed, and now I said something that really did put me under the ban:

"I would advise you to wear a uniform next time, because from what you have said I was licensed to believe that you were just a common ignorant civilian."

This additional remark was not exactly soothing, but it did bring all parley abruptly to an end. I hurriedly got out my apparatus, secured some of the water, and sent it down to Washington to James Carroll, ex-member of the Yellow Fever Commission. Then I put on my civilian clothes and went traipsing up to New York to see General Grant.

The General was very kind, reproved me heartily for having spoken as I did to Major —, and sent for his cantankerous Inspector-General. I disarmed him right away by saying:

"Of course I'm going to take my medicine—for I'm guilty as hell of having been disrespectful, after what I said at the end. But there is one thing very evident—we have all been working for the best good of the soldier. All I want you to know, before I get my punishment, is that there is nothing personal about this after all, and that I am sorry for what I said in the way I said it—"

"Which means," interrupted Major ---, "that you really meant what you said."

"Yes," I replied, "I did."

"Well," said Major --- to General Grant, "I'd like to retire my charges. This damn fool certainly knows how to tell the truth, anyway."

And from that day to this, no two men have been better friends than Major --- and I.

Three days after the retraction of charges, word came from Washington: "Water heavily contaminated with human sewage. Unsafe to drink. Carroll."

The Battalion of Engineers had a specific duty in being thus the first on the ground. They were there to lay out the camp and make all sanitary arrangements. And now one more was added—a filtration plant for water, the details of which I had to draw up myself.

But, when lying on my army cot and looking out through the tent flaps into the prolonged twilight over those cool mountains, I had time to dream again of the tropical land I had left. And those dreams took form. Work accomplished brings more work to a normal man. The cause of the anæmia of Puerto Rico had been found, an organization had been created to combat the disease, and my mind looked down the vista of years to the day when that work should have been consummated. What then? Why, the most natural thing was to provide for a successor to that work. A group of men trained for action could not be made to stop and fold their hands, never again to work after a given date. If the cause of anæmia had been discovered, as it had been, why could not other scientific findings be made in a field so rich in possibilities?

And thus was born the idea of the Institute of Tropical Medicine and Hygiene of Porto Rico. My first impulse was to create a teaching unit, a school of tropical medicine,

under the auspices of some great United States university. I reached for my portable typewriter, dashed off a letter proposing such a school, and addressed it to the Governor of the Island, Beekman Winthrop.

Governor Winthrop's answer was prompt and kindly. He approved, of course; but he would like to have his approval take the form of something preliminary. Puerto Rico could not afford suddenly to create a school of tropical medicine.

Little then could I imagine the great fruit which that impulsive letter of mine, dated September 5, 1906, was finally to bear.

2

On the 24th day of April, 1908, a disastrous cyclone swept across the southern portion of the States of Louisiana, Mississippi, Alabama, and Georgia. This giant storm hewed a path a mile wide through the glorious piny woods of Mississippi and, in tearing across the State, struck the town of Purvis and reduced it to a mere heap of boards. Naturally, the mortality was very high, somewhere around 500; and about 1,500 were wounded, out of a population of less than 7,000. United States war vessels in the Gulf sent immediate aid and placed Navy Medical Officers in charge, who telegraphed for instructions from Washington.

When the Surgeon-General of the Army heard that, for the first time since the Civil War, Mississippi had appealed for Federal aid, he claimed for the Army the right to take charge of the situation. Immediately, he bethought himself of the Hospital Corps Company, practically mobilized for war down at the Washington Barracks, under the command of Captain Ashford; and orders were received for

that company to proceed with all despatch to Hattiesburg, the nearest centre to Purvis.

Within twenty-four hours we were on our way. My assistant, Lieutenant Howard Bailey, was one of my schoolboy friends in Washington. Major Simpson, a line officer, was in command of the expedition. It did not take us long to pitch camp in tents, raise our field hospital and begin to work. At the very outset I received a telegram, from which I quote in part:

YOU ARE ON YOUR METTLE TO HANDLE A DIFFICULT SITUATION REQUIRING GREAT TACT AND PATIENCE. . . . WAR DEPARTMENT IS BACKING YOU FULLY. I AM RELYING ON YOU TO SMOOTH DIFFICULTIES AND TO CONVINCE MISSISSIPPI THAT WE CAN DO THINGS AS WELL OR BETTER THAN ANY BRANCH OF GOVERNMENT.

O'REILLY, SURGEON-GENERAL.

The Federal Government had appropriated \$250,000 to be expended for relief work. I contracted with the two leading physicians in Hattiesburg, who had rival private hospitals, to furnish beds for the sick and wounded. When their wards were full, I opened up a hospital in the commercial hotel. This, together with our field hospital, took care of all our patients. There followed a steady cleaning-up of the victims of that storm and an equally intense sanitary campaign to prevent epidemic disease.

Toward the close of our ministrations, we were formally invited by the male element of the town to a "fishin' party." I accepted the invitation, for I was intrigued about the nature of the festival. It seemed that Hattiesburg was a local option town, and that the "fishin' party" was the standard antidote thereto. So into the creek we went. All convention disappeared as if by magic, once we were deep in that swamp redolent of the velvet-petaled mag-

nolia. Mysterious boxes and baskets disgorged their liquid contents, which were eagerly seized upon by saint and sinner. I remember being profoundly shocked to see the president of the bank, who was also a deacon in the church and the head of the Sunday School, discard his trappings of morality and plunge riotously into a corn whisky episode that would have done honour to any mountain-district in Tennessee. To close that day's festivities, they swung bottles from distant tree limbs and shot away first the bottle and then the neck; and then I was handed the Colt and managed to split one of the strings—for I had not been in the Army for nothing.

They had a monstrous banquet in Hattiesburg when the time came for us to leave; and after a deal of floral oratory and thickly bestowed praise, which made me blush—for I was young then—they presented Major Simpson and myself each with a handsome gold watch duly engraved:

“From the grateful State of Mississippi to the efficient etc.—”

It was an embarrassing moment; because, if there were one thing that we could not do in the Army, that thing was to receive a reward from any organized Government—municipal, state, or national. We thanked them, but explained that it would be impossible for us to accept substantial tokens of their friendship. They gracefully accepted our explanation.

The next morning we left for Washington; and there I had the exquisite pleasure of letting my dear old Chief see for himself that his Medical Department had not failed to sustain the standard which he had set for it. I was able to inform him that not over \$60,000 of the \$250,000 appropriated by Congress had been spent, and that no relief situation now existed at Purvis.

However, I had not heard the last of that expedition.

Some time later, while I was drilling my company, a spick and span orderly arrived on the parade ground, saluted, and said: "Major Ashford?"

"Yes?"

"The compliments of the Chief-of-Staff, who says he wants to see you in his office immediately."

Now Chiefs-of-Staff are not in the habit of craving the presence of majors, mere worms beneath their feet, unless their intention is to squash them; and so I went to the War Department that day very much as one would mount the gallows.

I was quite right. The Chief-of-Staff had not sent for me to acquaint me with the fact that I was one of the most efficient officers he had ever known in his life. He looked at me just as I used to look at my orderly, and in a saw-like voice he said:

"A nice mess you've gotten us into!"

"What do you mean, sir?"

"Go in to the Secretary of War. He'll tell you soon enough."

I betook myself to the Secretary—it was William Howard Taft—and, when he heard my name, there came into his face more than a trace of the Mississippi cyclone.

"So you're the one, are you? You have managed to involve me in a pretty pickle with the President, and, if it will do you any good, I want you to know that it's about the first serious disagreement we have had. You know, as well as I do, that you can't accept gifts from the State of Mississippi."

"But I refused it, sir," ventured I.

"Yes, you did! I've seen refusals like that before," he said—speaking, doubtless, from the depths of his experience as a politician. "Well," he resumed, "of course I told President Roosevelt that you couldn't under the law re-

ceive this watch, and that the Judge-Advocate General upheld me. But the President smashed his fist down on the table and replied: 'He earned it, and he's going to have it. You can have the inscription changed, where it reads "from the State of Mississippi," to "from Mississippi friends," if you want to, but he gets that watch.' Here," suddenly drawing the watch from a drawer, "take the damned thing and get out!"

But there was more than a trace of a smile lurking in the eyes of the fat and genial Secretary—and besides, I had had enough of presentation speeches back in Mississippi.

3

When the time for tropical service came again for me, I was returned once more to Puerto Rico. I now had quite a family. Mahlon, the eldest, was eight years old; Margarita, the youngest, had been born two years before at Washington Barracks; and the sunshiny Gloria Maria extended one hand to her elder brother and the other to her younger sister. No longer could I be satisfied with the quarters of a nomad.

I was accredited again to the Regiment of Puerto Rico with headquarters at San Juan; and a charming home which once had belonged to a Spanish Lieutenant-Colonel of Artillery was assigned us. It was a rambling old right-angled house with a flat roof, whence, on cool summer evenings, we contemplated the city lying at our feet. Abruptly overhanging us was the frowning citadel of San Cristóbal, defense by land and sea of the San Juan of the 18th Century. Its ramparts and gun platforms now were overgrown with peaceful turf. It was honeycombed with a hundred underground passages, mysterious and complicated, whose very uses had been forgotten. San Cristó-

bal is one of the finest untouched heritages of Spain's old colonial possessions in America—a veritable medieval fortress with ramparts and scarps, bastions and jutting stone sentry boxes hanging like little bird-cages over the jagged rocks against which the Atlantic shivers its waves into scud and spray.

The house, and a wall separating it from similar quarters just below, enclosed a charming patio, cool and shady from the spreading of a giant tamarind tree, under which were mounds of flowers banked with blossoming vines and bushes. This little garden was the centre of juvenile activities, and in it were celebrated the birthdays and the manifold festivals of the year.

Here, contentedly and quietly, I lived my life as Post Surgeon, and another life, quite different, the life of a practising physician in San Juan. How I gradually evolved into one of San Juan's physicians, or, to be more accurate, one of San Juan's surgeons, cannot be explained. It was a metamorphosis that seemed to have come quite naturally. My Commanding Officer, Colonel Howze, was the strictest kind of a martinet; yet, with all his military precision and his occasional harshness, he never interfered, though he knew that I was consulted regularly every afternoon by an ever-increasing throng of people who had no connection whatsoever with the Army. He probably thought, and rightly, that the value of a physician lay not so much in crudition as in practice and experience. Little by little, I accumulated enough to build myself a home, later on, in the tropical island of my adoption; and in this period of three years I formed friendships among my colleagues which have withstood the buffettings of many storms.

It was about this time that we were forcibly reminded of our intimate connection with the ancient past. Some experiences seem to belong in Alice's Wonderland. Out

of a clear sky came an order for me to act as honorary pall-bearer to no less a personage than Juan Ponce de León, seeker after the Fountain of Youth, dead these four hundred years. (Imagine, if in New York City one should be informed by some friend that he could not keep a luncheon engagement because he had to act as pall-bearer at eleven o'clock that morning for George Washington!) I was formally told off for this military duty when the First Battalion of the Puerto Rico Regiment was ordered to transfer the remains of the first Governor from the old burying-place of the Ponce de León family in the San José Church to the Cathedral, as part of the ceremonies celebrating the 400th anniversary of the colonization of the Island.

Among the old Puerto Rican families, my wife's family was a dominant one. My father-in-law, Don Ramón B. López, Marques de Villar from his Asturian father but strongly republican in taste, objected to the trappings of nobility. On reaching years of discretion, however, he exercised the habit of command inherent in his blood; for he founded the first daily newspaper on the Island, and through its columns he shaped public opinion in those days of transition. His wife, Doña Micaela, of a noble family of Barcelona, was a model of unbending propriety for the social life of the Island, which then was still in a patriarchal state. In that society, people found time to visit each other. Friendships were close, contacts frequent. Wine was sipped in the late afternoon, and ices and fruits were served in the evening. The stately convention, which dominated those old days, was as delightful as it was unusual to interlopers from America.

Particularly warm among the intimacies of that society was the relationship between the house of Ashford and the house of Saldaña. Dr. Saldaña was one of the most eruditè

and courteous old physicians in the Island. He was the physician of the wealthy, the intellectual. He was the Solon of Society. His huge stone corner house, opposite the Municipal Theatre and facing the Plaza de Colón, was sumptuously furnished in the style of a hundred years ago. Solemn paintings of forebears looked down upon the enormous parlour, from the wide balcony beyond which one looked down with aristocratic aloofness upon parades and *fiestas* in the square beneath. I became the medical confidant and physician of the older man, represented him more and more in his practice, cared for his daughters and his wife, and eventually shared his every confidence.

At carnival time, when the plaza was filled with a riotously happy, dancing, masked, and costumed throng, while the theater blazed with lights, and the spirit of gayety pervaded every nook and cranny of the old walled city, we all shared in the illusion that we were princes and princesses, dukes and *marquesas*. Then we lived a life apart. The business life and the office life of San Juan were smothered with flowers and draped with ermine; and the spirit of courtly old Spain dominated the age of the department store.

4

There came a day, however, when we found ourselves being transported from the Old World atmosphere of our tropical island to the Old World in fact. At last, we were to view with our own eyes the scene of those long-spun tales—hewn, some of them, from the solid granite of the Latin and Greek languages—which had been drummed into us by men and women who knew even less of Europe than we did. My credentials were in my pocket. I was Delegate on the part of the United States of America to no less than two international congresses—one on Industrial

Hygiene, the other on Alimentary Hygiene, and both to be held at Brussels in the midst of the great International Exposition of 1910. So everything was in the superlative.

As in a dream I wandered about Paris, in taxicabs and open victorias in the afternoon when my wife accompanied me, and on foot before breakfast when I started out alone on sentimental pilgrimages through the Latin Quarter. For as a youth, if my preferences were consulted, I much preferred romance to reality. But this is NOT to be a guidebook to Europe. I shall mention only those things which made especially deep dents in that part of the brain with which we are supposed to think.

Then suddenly, as I now recall it, the rapid confusion of shifting scenes was arrested, and I found myself in a spacious hall, filled with 2,000 people and the clamour of five languages. So this was an International Congress on Industrial Hygiene—a body convened, supposedly, to sift out from the scientific chaff of ten years the grain which could be relied upon to bear fruit for the coming ten; a task which seemed Herculean amidst that clamour and struggle for recognition.

One thing, however, was immediately made clear to me: that no better device than this Congress could have been found for demonstrating the smallness of young men. It seemed to me that any man under thirty-five, no matter what his credentials, would have to be either a fool or a budding Napoleon were he to imagine he had any right there, other than that accorded him by nature of breathing twenty times a minute. The dignity of the men whose names we all had heard from our medical infancy may have been feigned; but to us at the time it was very real. Yet there was I, both a delegate from the United States of America, and a special delegate to represent the Island of Puerto Rico in one of the scheduled discussions. This dou-

ble honour served only to increase my terror and made me feel like a two-headed monster.

The Congress had wisely determined to divide three of its four days into an allotted time for each of six great questions, thus leaving us the fourth day to digest in discussion the evidence presented on the preceding three. The first two questions rolled by, and I must have understood at least one per cent of what I heard. But when the morning of the eleventh of September dawned and the hookworm was tossed into the arena, I gathered no courage on familiar ground. Instead, I was subjected to a long list of speakers whose names in the history of *uncinariasis* were as a list of all the gods in the Roman, Greek, and Persian calendars, from Zeus to Zoroaster. The idea of my daring to arise and contribute a few words to the Jovelike bolts of Hayo Bruns, of Malvoz, of Haldane! I felt as though whatever I had to say would be received like the voice of a newsboy crying the late edition of an evening paper in at a window of the House of Commons.

So, one by one, those great men arose, let fall the pearls of wisdom, and reluctantly sat down (they all had a great deal more to say, of course); until finally, when it was already past the lunch hour, the mighty Bruns stood up to state modestly that his country, by fortune or destiny, was enabled to place before this Congress a record of 30,000 miners treated for hookworm disease at the cost of only \$2.00 per man.

Suddenly a change came over me, the like of which I had never before experienced. All of those glorious figures rapidly faded; and there remained only the familiar picture of a long bare pine-board room, in a country house on the outskirts of Utuado, where day by day we three men of the Porto Rico Anæmia Commission had laboured. I saw again that extended line of pale figures winding along the

walls, out through the door, down the stone spiral stairway, into the patio and across it, to lose itself finally in the fringe of rich green banana plants. . . .

“Mr. Chairman!” I had to repeat it four times before his Excellency heard me.

After prompting from his Secretary, his Excellency replied: “The Delegate from the United States of America.”

“Gentlemen, the hour is late and I have prepared no address. I came to learn and not to speak. But the remarks of the last speaker, the Delegate from the German Empire, have impelled me to say a few words before this Congress closes its discussion of the third question. I do not, of course, know the circumstances under which the campaign in the mines of Westphalia was conducted, but I simply request that this International Congress record the following facts which I, this time representing the Island of Porto Rico, am privileged to submit. In 1899 *uncinariasis* was first recognized as being the cause of a fatal anæmia prevalent among the agricultural labourers of that Island. In 1904 a campaign was begun which is now about to terminate. So far we have treated around 300,000 cases, which we have cured at a cost of \$183,898—or between 50 and 60 cents per individual. As a result of this campaign, a total mortality for all diseases, oscillating between 25 and 40 per cent, has been reduced to 20.9 per cent.”

That was all I had to say. So I sat down. But the Congress rose, to a man. The Island of Puerto Rico was treated to the first big explosion of enthusiasm which had interrupted an otherwise Roman sedateness; an enthusiasm as genuine as it was noisy, from a body of men to whom one could apply nothing less than the adjective *august*.

From that day on I was not so painfully aware of the small size of my island home, nor of my youth and inexperience. I was asked by the President of the Congress,

Dr. Moeller, to a dinner which he bestowed upon the anointed, and was immensely flattered to have my opinion requested by no less a deity than Professor Terni of Italy.

5

At the close of the first Congress we meandered from Cologne up the Rhine to Heidelberg, saturating ourselves more and more with the pure delight of glorious scenery and the glorious past. There was only one deep regret, and that was that I had obstinately refused to take the German language seriously while at college.

But our real objective, of course, was Spain; and thither we went by way of Geneva, Lyons, and Avignon to Barcelona, which was in its characteristic state of high excitement. Then as now, the revolutionary pose of Barcelona and the offish ostentation of the extremely discordant Catalán language were being used to prod the tender flesh of the proud masters in Madrid. In Spain, naturally, the speech was just as familiar to us as English, and, once the Catalonian realized that no particular object was served by trying to force his own jargon down our throats, he conversed most entertainingly in good Spanish.

It did not take us long to sense the noble pride of the hard-working, practical Catalonian. But for the light-hearted, the worshiper of nature, Barcelona was hardly a pleasant place. Here, in the midst of lively memories of outrages upon the Church, of burnings and sackings of monasteries and nunneries, and of threats of desecrations yet to come, were to be found some of the most exquisite monuments of medieval church history. But the dark grandeur of the ancient and begrimed Cathedral enfolding the earthly remains of Saint Eulalia, the eerie architectural fantasy of the modern Sagrada Familia, and the gloomy and

ascetic fastness of the monastery at Monserrat, repository of the Holy Grail and redolent of Parsifal, form a series of pictures rather more in keeping with the sombre forebodings of a Dante than with the harmonies and beauties of Heaven. One needs real elasticity of imagination and a true reverence for mysteries and miracles to appreciate this marvelous dramatizing in stone of a harsh and loveless eternity.

Soon we struck out diagonally for Madrid, which still clung to the knightly tradition of its feudal past. After a week of delight in that richest of museums, El Prado, where the most of my time was spent, I left again for Brussels to attend the second Congress, that on Alimentary Hygiene. Of it, only a faint and confused memory of chemical formulas and respiratory quotients remains. It is shameful to be obliged to acknowledge that an International Congress, on what later I have made my specialty, left no furrows in my gray matter. But such was the case.

On my return, after a few more days in Madrid, we visited Granada and the south before taking ship at Gibraltar. There were, we reminded ourselves, two conquests reflected in the fall of Granada—one, the wresting of control of lower Spain from the Moor; the other, the conquest of the soul of Spain by the Moor. The imprint of the luxurious lips of the Oriental æsthete upon the cheek of the barbarian remains visible to this day. For much of the nobility of character, reckless bravery, and fanatical loyalty to his traditions have been inherited by the Spaniard from the Moor, whom he boasts that he conquered. It has always seemed to me that the finest expression of the Oriental is to be found in the oval-faced, olive-complexioned Moor, that queer mixture of intense sensuousness and cold logic. There is something extremely sym-

pathetic to me in the responsiveness of the Moor to beauty and to truth; but his response to both is marred by a certain harshness and intolerance.

In the Alhambra, the very spirit of the Moor is imprisoned in enchanted stone. But in Granada, in Seville, in Córdoba, the Moorish spirit is an integral part of the people, of the scenery, of the language itself. It was in the *Barrio de los Gitanos* that this was most strongly brought to our attention. No one who has not heard the guitar of a Pepe Amayo or the castanets and tambourine of one of those dark-haired, olive-skinned, lithe young women of Andalusía can form a just conception of the character of the Spanish people. They themselves lay undue stress, I think, on the palpable differences in language and customs between the northern and southern provinces. But we seemed to see in the conglomerate a something that distinguished these Europeans from all others, and that something was the Moor.

This has for America a tremendous significance; for it is largely from these Andalusian gypsies that the democratic mass of Latin America has descended and mingled with the Indian. The northern provinces are by no means unrepresented, of course, and when things run smoothly and the emotions of the people are not exalted, it is the Castilian, the Catalonian, and even the Galician that rules. But in time of stress and excitement the power is wrested from them by the descendant of southern Spain, and it is the dash of Moorish blood that will explain some deed of incredible violence or some equally incredible flight of oratorical fancy.

For those who love contrast, Gibraltar is a rich mine of experiences. But, when I found myself abruptly confronted by that stronghold of the Anglican Church, the British soldier, and the beloved tongue which I had learned

from my mother, I knew that I had been fatally touched by the restless soul of Spain. And in my wife there had awakened a long-dormant craving to return to the home of her forefathers, and to the noble estates they had forever left; to the very smile and bright sunshine of the heart of Spain; to the click of castanets, the mellow notes of the guitar, and the gay colours of the bull-ring. As we sailed out of the harbour, our parting thoughts must have been somewhat divergent; for I was bidding farewell to a carefree, enchanting pageant, and she to the land of her ancestors and the source of her charming personality.

6

In 1911, however, my pleasant career of routine and reverie was broken in upon—though I can fairly say that I was largely responsible for that interruption.

A new Organic Act to govern Puerto Rico was under discussion. Heretofore, sanitation had been represented by a Bureau in the Department of Health, Charities, and Corrections, which was presided over by a political chief who was a layman. The Director of the Bureau of Sanitation was under this man, and was represented in the Government by him. The Porto Rico Anæmia Commission already had flayed the existing system without mercy, and had held up this weakling to the public gaze. Now the time had come for one of the Medical Association to demand representation, in the Governor's Cabinet, for all that we stood for. It remained only for us as a body to demand autonomy for medical matters in the Government.

As the Island was under the War Department, Colonel Jefferson Randolph Kean of the Medical Corps, who had created an autonomous department for Cuban sanitation, was sent to confer with me and others; and it was not

long before an independent Department of Health was created with a Commissioner at its head.

Both from the Island and from the Army came the demand that I be made the first Commissioner. However, I could not accept this position under the civil government without losing my position in the Army, which I did not wish to do; and so Congress was asked to pass an enabling act. But there were other conditions of a more private nature which I was obliged to secure from the Governor. And the chief of these was that, if I became Commissioner of Health, I would be permitted to select my own personnel—particularly my Board of Health, which was to be my legislative and advisory body. This was rather high-handed procedure, I will grant; but I knew the men with whom I should have to deal. To my surprise, the Governor acceded, though the appointing power was really his.

The enabling act was passed; but the Secretary of War no sooner had ordered me, in the form always adopted for the military service, to act as Commissioner of Health under this law, than the Governor sent for me and said:

“Of course you realize that you are the only one who can take this position and make a success of it, as you drew up the law with Colonel Kean, and your professional friends here are a unit in supporting you. But I have unfortunately promised you more than I could promise. I am Governor of Porto Rico. But in reality I am the servant of the people. And the ruling party is the people. Willy-nilly, I have had to bow to their demand that Dr. —— be made President of the Board of Health. I hope you will take this right, as it is in me to help you all I can. I am afraid that I shall have to ask you to allow me to appoint this man.”

My reply was that under no circumstances would I accept Dr. ——; and I told him why I would not—reason

good enough for any man, too. But he stuck to his creed. And so I said, very cheerfully: "Well, I'm sorry, but you will have to make a choice right here and now between Dr. —— and Dr. Ashford."

"Look here," he countered, "you can't be Governor of Porto Rico, you know."

"They offered me that position," I replied, "and I didn't want it. But I do propose to be Commissioner of Health."

I think he would have liked to give in, but he didn't dare. He had pledged his word. So I rose, went straight to the cable office, and sent a message to General Edwards, telling him that I found it impossible to serve as Commissioner of Health and asking him to notify the Secretary of War.

There was the devil to pay over that cable. I was told that I had been ordered by the Secretary of War to accept the position, and accept it I must. I replied that the Secretary of War probably would not insist on my accepting a civil position if I did not wish to do so.

It turned out just as I had predicted. The order was countermanded, and I was relieved—after having served exactly eight hours as the first Commissioner of Health of Puerto Rico.

PART THREE
RECONNAISSANCE OF BRAZIL



Chapter IX

1

ONE day in the course of my life in the West Indies stands out from every other day with such startling vividness that I can still recall my thoughts, my hopes, and my misgivings.

I had been given the keys to what was, back in Spanish times, the stable for the coach and horses of the Lieutenant Governor of Puerto Rico—the basement of a massive old square building called El Palacio Rojo (The Pink Palace). Wedged between it and the Governor's Palace was the Hospital de la Concepción, a quaint little old-fashioned mission hospital with a chapel, perching high on the sea-wall built in ancient days to protect the Island of St. John the Baptist from the sporadic attacks of marauders and buccaneers who infested the water-ways of His Most Catholic Majesty.

This spacious basement room occupied the entire ground floor of the large palace. With its Moorish arches and the columns supporting them, it reminded one of the Mosque of Córdoba. And this was to be converted into the permanent quarters of the Institute of Tropical Medicine and Hygiene of Porto Rico—for my dream, first crystallized into words back there in Mt. Gretna in 1906, had come true with the creation of this institution by the Puerto Rican Legislature in 1912.

Here, at last, there would be offices, laboratories, sterilizing rooms, and a long laboratory table with microscope

for each of the four members. There still remained, however, a menial task, but one which required continuous personal supervision. The dingy, dusty, dirty basement with its cement floor had first to be repaired, thoroughly washed down, dried, painted, and rendered as clean as possible for the introduction and allocation of the necessary equipment. Electric lights, sterilizers, and incubators were set in place. Here all the records of the old Porto Rico Anæmia Commission were stored on shelves. And here the Institute was to remain, until it was transferred bodily to the handsome School of Tropical Medicine built especially for it in the year 1924.

The plan of work of the other three members of the Institute was mapped out by them; and I regret that I have not now the space to record a well-merited discussion of their projects.

But I had resolved, for my own part, to make this Institute the home of an intensive investigation which should complement our knowledge of hookworm disease. For a long time the main obstacle to health in the life of the poor had been removed. The nature of their anæmia had been enunciated since 1899; and furthermore, its cure had been demonstrated on a large scale. But what of the anæmia of the well-to-do, of those who did not have uncinariasis, of those whose anæmia assaulted them mysteriously in the midst of plenty? What if, after having solved the question for the labouring man, one could also solve it for his employer,—solve it for those who lived in comparative affluence; for those who were the brains of the country, stricken treacherously by a hidden cause which left no hint of its identity, and yet which rapidly descended into depths so profound as to warrant one of the most dreadful of all diagnoses—progressive pernicious anæmia.

Almost immediately after taking station as a military

officer in San Juan in 1908, I had been brought face to face with this formidable problem. My patient was a young society girl whose life was sheltered and whose habits were those of her privileged station. Day by day I saw her fade like a flower from a disease which baffled every attempt made to stay it. Had hers been an isolated case, I might not have been moved as I was to delve further. With the diagnosis of pernicious anaemia and a sigh of regret, my duty would have been done. But, fortunately for science, she was not the only one. Hers was a disease shared by bank president and bank clerk, by men high in public life, by the wealthiest and most favoured women of society, and especially by the foreigner to the torrid zone—particularly the wide-awake American with new ideas for the country.

One could hardly visualize an epidemic of pernicious anaemia; for epidemics of pernicious anaemia are unknown in medicine. But one day there strolled into my office the cashier of an important bank, a young American, full of life and yet dying of this strange disease. This young man was blessed with descriptive powers, and he painted a picture so forcibly connecting his anaemia with a digestive disorder that my eyes were suddenly opened. Why, this was no pernicious anaemia at all!

This was tropical sprue!

And what, pray, is tropical sprue?—one may inquire. I shall try to answer with what I consider a typical picture.

Imagine a rosy-cheeked, athletic young American girl fresh from one of our great universities. She weighs 135 pounds, is 66 inches tall, and can win set after set of tennis from you, madam, after she has already carried you, sir, to five full sets. She has come down to teach in school for a couple of years, in order to learn Spanish.

One day she is missing from her classroom, and you saunter over to ask what is the matter. She doesn't like

to say—she is sick. What has happened is that she has had a furious diarrhoea following a cake party the night before. But she doesn't get well in a few days. The diarrhoea settles down to a steady flux with evil-odoured movements, not so many, but enormously large with huge amounts of gas. There is no blood, no mucus, no straining. She goes back to her school, but you notice that she fails to play tennis when four o'clock comes round. She goes home, takes a book, and lies down.

A couple of months pass by, and she calls the doctor. He is shocked to find that she weighs but 105 pounds, that her rosy cheeks have gone and are replaced by a sallow, yellow, waxlike colour. She has a haggard drawn expression and states that she is so weak she can hardly crawl about. She is suffering from a fiery red, raw tongue, a burning in the pit of the stomach, complete loss of appetite, bloating from intestinal gas, and a white, foamy diarrhoea. Her nerves are shattered, she is sleepless, and her muscles are sore and aching. The least exertion gives her palpitation of the heart; and she has lost her high spirits, her good memory and her better humour. Moreover, she has numbness in fingers and toes, and she wakes at night with cramps in the legs.

She disappears for a couple of months more, and you look her up. She is now crawling about, a mere shadow of her former self. Her friends no longer recognize her. Her weight has descended to 80 pounds. Her complexion has become dark, and her skin is symmetrically pigmented with brown stains over forehead, cheeks, arms, and back. Her eyes are sunken and have lost their light. But above all, she has a deathly look; and she tells you that her new doctor has found that she has a serious anaemia, with but one-fourth of her normal blood value. All the former symptoms are exaggerated: the tongue is like a piece of raw

beef, and eating, even the swallowing of saliva, is painful.

Her days in the tropics are numbered. Before long she goes North—there, nine times out of ten, to be incorrectly diagnosed and to die of “tropical diarrhoea” or pernicious anaemia, or some other disease invented for the occasion and circumstances. How many cases have I known of the kind, and how inexpressibly sad they have seemed! How maddening to the desperate physician!

That day, however, when the young American banker made plain to me the diagnosis of his disease, I could but ask: Why have I not seen all this before? And immediately came the answer from within myself: Because you have been treating the miserably poor who do not have sprue. It is only now that you are seeing the other side of the page.

And it happened to be the first time that sprue had been recognized in Puerto Rico.

2

Soon I had a full dozen such cases—and not one word to guide me save disproven theory. But, since this affection started with a sore tongue, burning in the stomach, a tremendous amount of intestinal gas, and a white, frothy, fermentative diarrhoea, I felt that its cause, no matter what, could be found in the intestinal canal; and therein I began to search.

Shortly, I secured from the scrapings of a sore tongue and from the contents of the bowel white creamy colonies of a fungus which corresponded in every way, as far as I could see, with *Oidium albicans*, said to be the cause of infantile thrush. Soon, however, I discovered that others had found fungi of this sort, and that Aldo Castellani, the successor to Manson as an authority on tropical medicine,

stoutly opposed the idea that those organisms were the cause of the disease. He based his objection on the fact that, instead of one *Oidium albicans*, there existed an almost interminable series of species distinct the one from the other by their peculiar fermentative reactions in the presence of some sixteen different sugars, some producing gas, others not. He also stated that the proper name of the genus, or breed, was *Monilia*: that the *Oidium albicans* of children with thrush was a species quite distinct from all of those found in tropical sprue; for it coagulated milk with an acid reaction, and did other things that the *Monilia* of the tropics did not do.

But I had seen enough by this time to make me believe that, basically, sprue was caused by the fungus I had found so consistently in my own cases. With almost unseemly haste, therefore, I began culturing scrapings from the tongue and sowing the faeces, until I had convinced myself beyond the shadow of a doubt that in three quarters of my cases this identical *Monilia* was present. Strangely enough, those cases in which I did not find it were the old chronic serious cases just about to die. It seemed as if a fair half of my chronic cases had been abandoned by the causative organism, just as rats flee the sinking ship. And that is really what had happened; for these little organisms require a very acid medium, and, in the more serious forms of the disease, the reaction of the bowel changes, reducing an exuberant growth to nothing or almost nothing.

I now settled down to do the obvious thing: to carry out a methodical series of demonstrations on animals. Five drops of a culture of the *Monilia* found in sprue were injected into the muscles of the tongue of a rabbit. After about forty hours, the animal was seized with a great deal of trembling, falling about as though intoxicated. At times it would scream out and then lapse into a semi-

conscious condition, its snout gradually falling to the floor of the cage, upon which contact it would endeavor to sit up and brace itself in a sitting posture. Much abdominal gas was developed and the mucous membranes were purplish. This animal died in 75 hours, and the autopsy revealed a general invasion of the blood and organs by the organism originally injected.

Next, two white rats were injected, with the same results; and, eventually, a group of seventeen guinea-pigs. Of these, nine died promptly on injection of pure cultures of this *Monilia*. As is well known by experimenters, an organism which is the cause of a disease can be raised in virulence by passage through animals. That is to say, if organism X is made to kill an animal in an introduction of thirty drops, and the organism then is recovered from its body, it will be found that only one or two drops suffice to kill the next animal. This was tried, and on finding that the rule held good for *Monilia psilosis*, as I had come to call my new organism, this virulent strain was sown in sugared beef-tea and fed daily to two guinea-pigs. Both died, and both showed inflammation of the lips and mucous membrane of the nose, comparable to the sore tongue of the sprue patient, the organism being recovered on death from the digestive tract, lung, and spleen.

Now six healthy guinea-pigs were chosen, in addition to one other which I had attempted to immunize by inoculation of six tiny consecutive doses of my *Monilia*. These seven experimental animals had poured over their regular ration of fresh grass an ounce and a half of a sugar-bouillon culture of the organism recovered from the dead body of one of the two animals which had just died. In the same cage, but separated by a partition of wire, were seven healthy guinea-pigs of the same age, over whose food was poured the same amount of a sterile bouillon-sugar

culture medium which did not contain my *Monilia*. The smallest pig of the first seven died on the next day, and cultures were recovered from its organs; and from then on, all save one of the guinea-pigs which had had the infected culture medium poured over their food died, as did the first, and positive cultures were recovered from their dead bodies. The only one which did not die, did not even sicken, was my immunized pig.

The control animals which did not receive infected cultures all lived. As it turned out later, most of the infected series had not died from the infection of the digestive tract, but from snuffling up the organism into their nostrils and getting a *Monilia* pneumonia for their greediness.

Monkeys were now tried by feeding the organism, as in the case of the guinea-pigs. But here the organism had been directly cultured from the fatal case of an American sick of sprue, who was at the time Prosecuting Attorney for the Government. Both of these monkeys recovered after a long period of diarrhœa and emaciation.

The conclusions drawn from these experiments were: that a species of *Monilia* recovered by me from about a hundred cases of sprue was a pathogen (a disease-producing organism) for current laboratory animals by hypodermic inoculation; that when recovered from a patient with sprue and injected into these animals it generally produced their rapid death from a septicemia; that when grown for a long time outside the body in artificial and frequently transplanted media it seemed partially or completely to lose its virulence, but that this virulence might frequently be restored by passing it through susceptible animals; that ordinarily an animal may not be killed by feeding this *Monilia* when freshly isolated from a sprue patient, but that, by first increasing the organism's virulence through hypodermic passage, it may then be fed, and

will then often kill; that in two cases a sore mouth had been produced in animals by this organism, and a severe and long-continued diarrhoea in several other cases.

By this time I was naturally quite excited, and felt that I had proven my point; but defects were found which somewhat weakened my conclusions—defects in laboratory technique which, for lack of experience, I had not fore-stalled. In general, however, I *had* proven my point: the organism was not harmless for animals, but could kill. The only question was whether they died of sprue or not; and animals, unfortunately, cannot talk.

3

But, though animals are dumb, men can write letters. In 1915, when I was deeper than ever in my scientific problems—just when the struggle over sprue was at its height—there came a letter from my old friend, Dr. Wick-liffe Rose.

Would I not now consider a trip to South America to start Mr. Rockefeller's work there? See how patient my friend had been—I had always found some excuse to keep me from going—yet back he had come, again and again, to the same theme. He wished this first expedition to include me. He felt that I knew the psychology of the Latin-American, both on account of my marriage and of my long residence in the Antilles.

This time I could not escape—more particularly, since Dr. Rose had enlisted the coöperation of my chief in Washington. So I accepted. A commission of three was named: Dr. Richard Pearce, Professor of Pathology in the University of Pennsylvania, an expert in medical education; Dr. John Ferrell, Assistant Director of the Rockefeller International Health Commission; and myself.

The plans of the Foundation had been made by the time I decided to go with them, but I requested that the survey and preliminary work necessary for a comprehension of our problems in Brazil be performed under the patronage of the Oswaldo Cruz Institute; and that for our field work, I be permitted to take a field dispensary equipment with portable tent houses. Both requests were instantly granted.

The acceptance of the plan to work from the Instituto Oswaldo Cruz was an exceedingly fortunate move; for the history of this Institute embodies the very spirit of that adventurous life to which we Medical Scientists refer as "professional,"—as if there were no profession in the world save our own. Oswaldo Cruz, when a very young man just graduated from the University of Berlin, was suddenly invested by his cousin the President with the terrible responsibility of sanitating Brazil. With the spirit of a *conquistador* he plunged into the great adventure of his life—the extermination of yellow fever from Río de Janeiro, which was a dangerous hotbed and distributing point of that disease for the whole country. As if by magic, in a period of months, he literally wiped out yellow fever and became the Chevalier Bayard of his people. An enormous purse of money was collected from the rich city to be given him as a token of appreciation. His reaction was typical of the man and of the best that shines out from a noble profession.

"Take this money," he said, "and build a great centre for the study of tropical diseases in Brazil."

And so the Institute was founded. Within an incredibly short time he had gathered together what was, without cavil or question, the most notable group of scientists and humanists which South America has ever seen. I need only mention Vianna, the discoverer of the cause of *ulcera granulosa pudendum*; Carlos Chagas, poet, great orator, and

still greater scientist, the discoverer of the *Trypanosoma* which causes the terrible American "sleeping sickness" bearing his name, and of which not eternal sleep but progressive dementia is the final stage; and Adolfo Lutz, German-Swiss, an exotic Nordic genius, frail and wasted from an unbelievably persistent life of research in almost every field of medical speculation, but chiefly helminthology and entomology. Counting upon the spirit of these men, I felt the necessity for enlisting their aid in the accomplishment of our great adventure, apparently quixotic, but grand in its possible outcome.

The second idea, which I insisted should be the basis for, and the principal factor in, the accomplishment of our object, was one of my own creation—an adaptation of my Army training—namely, the equipment of a mobile dispensary, emergency hospital, and clinical laboratory prepared to work under all kinds of field conditions. Such a unit, borrowed from the Army, was employed for the first time by myself in the campaigning against the anæmia of Puerto Rico begun in 1899. Now, unfortunately, my project clashed with the cast-iron itinerary already decided upon in New York. The Commission was to leave for Brazil in three weeks. This called for quick work and a considerable amount of foresight. Discounting unavoidable delays, I had but ten days in the United States wherein to select equipment, place orders, and assemble the articles from seventeen different firms, many of which were outside of New York. Even so, out of eighty-nine huge packages and crates, weighing in all about five tons, only ten items arrived at Río too late.

I was determined that this expedition should have the credit of supplying to public health work an element which up to the present had been lacking: it would bring to the sick poor of country districts, at the scene of their daily

labour, a practical solution of their physical problems, and it would also instruct them how to preserve their health. When we began work against hookworm in Puerto Rico, we made the error of supposing, in our enthusiasm, that we could run a dispensary with a hospital annex for the diagnosis and treatment of one specific disease; but we had neglected to visualize the point of view of the sick man. Sick people go to a physician not because they have this or that germ or parasite, but because they feel sick and want a doctor to do something about it. Therefore, such a unit should be prepared, both in staff and equipment, at least to diagnose and give general treatment for *any* physical ill, whether medical or surgical.

In other words, in order to obtain a cross section of the diseases and accidents which befall the rural population, one should have a mobile unit embodying all the spirit of an urban medical centre. In this way, many deviations from the normal can be intercepted at their source and thus prevent the overwhelming of the city hospital which, for the rural population, is generally inaccessible, or accessible only after great personal sacrifice and effort. In fact, the absence of these units is the chief reason why superstitious cures and the curse of patent medicine prevail out in the country.

4

The Commission embarked on January 21, 1916, on the *Voltaire* of the Lamport and Holt Line. As she was an English vessel, sailing under the English flag, she was, of course, subject to the outrages of our friends the enemy, and so had to sail without lights. She was a slow but commodious old thing, the food was excellent, and British marine discipline had taught the servants to be polite and respectful, even though they mightn't feel that way.

My colleague, Dr. Richard Pearce, I found, was at heart a pathologist. That is to say, bearing in mind that no pathologist had ever before been known to have a heart, he was a terror to lyric medicine, and was always ready to prove that the mind took absolutely no part whatsoever in disease. To him, disease was always a lesion, if not to be found macroscopically, then microscopically; and if not microscopically, then the lesion was there all right, but the inferiority and stupidity of all other branches of medical science had failed to give him the means of revealing the mechanical damage done to the tissues.

But Pearce had been able somehow to escape the blight which too often befalls the spirit of the pathologist, that auditor for the expenditure of human emotions in the practice of medicine. His sense of humour was of the keenest, and was outdone only by his exceeding good-fellowship. He was not only a brilliant and scholarly scientist and educator, but also an American who always made friends for his country when he visited another. His death must have been a terrible blow to the International Health Board.

John Ferrell was a typical American of the Appalachian Range. An intense Southerner, he nevertheless was first a North Carolinian and, I think, would cheerfully have accepted the definition of his State proffered by some ribald jester: "A peaceful valley wedged in between two huge mountains of conceit, Virginia and South Carolina." His honesty and bluntness were as great as his marked administrative ability and his common sense.

Of our fellow passengers little need be said, save in one case, that of an Argentine who was returning from a pilgrimage to the United States undertaken, apparently, for the sole purpose of finding enough distorted facts to nourish the grudge he bore against us as a people. He was a rich and prominent publicist in Buenos Aires, and he pos-

sesed all the insolence which goes with wealth and with systematic petting on the part of subservient literary friends. His main criticism of New York was his objection to high buildings:

"To think," he screamed in his furious rage, "that these cursed people who value only money and have no souls dare even to say there is beauty in a building thirty stories high! Americans will do anything for money. Instead of frankly admitting that they go up in the air rather than buy more land which is expensive, and also economize time which is supposed to be money by concentrating at the scene of their business, they impudently declare that they have invented a new architecture and a new era, superior to all the painstaking classics of Greece and Rome—whereas in reality it is merely their insatiable greed for money, money, money! In Buenos Aires where we are cultured in a true sense, art and comfort are bought with money but are esteemed to be superior to it."

My little Brazilian teacher of Portuguese—for I had thought it wise to acquire a few polite phrases, before bursting in upon Brazilian society—listened reverently to this outbreak of Jovelite wrath, and then insinuated that, after all, Nature herself sought the sky through her mountain peaks, and that the height of a waterfall was the determinant in its beauty.

My Argentine friend jerked himself round and snorted: "Where are *you* from?"

The Brazilian politely replied that he hailed from Río, whereupon the testy old man replied: "Natural beauty is the only thing that Río possesses, for you all live just as you are!"

The other must suddenly have remembered the name that the Argentine occasionally gives the Brazilian: "El

Macaco"—the red monkey of the species *Macacus*—for he turned very red.

Seeing trouble ahead, I thought I would change the conversation, and remarked: "This gentleman is teaching me Portuguese, and I find that it is very much like Spanish."

Whereat the irrepressible retorted: "There is quite a difference though, for Portuguese is only *español podrido*—decomposed Spanish."

As a matter of fact, however, even the little Island of Puerto Rico had taught me that there is no country in Latin America where Spanish has been so much outraged, not only in composition but also in pronunciation, as in the Argentine Republic.

Chapter X

I

WE ENTERED the handsome port of Bahía on the 6th of February, 1916. There is an air of identity about all American tropical ports—their sprawling languid indifference, their sleepy good-nature when awakened by a chance visitor. Bahía is built on two levels, communicating by huge elevators to save effort—one suspects—rather than time. It drains enormous districts of sugar, coffee, and tobacco, as well as cocoa and grazing lands to the south. But there are only ten persons to the square mile in that area, and from 85 to 90 per cent of them are negro.

We had time only to make the acquaintance of the Medical School, then attended by some six hundred students. Here we received a foretaste of diseases not known to us in Puerto Rico but peculiar nevertheless to American tropics. At the risk of being considered impolite, I got myself initiated into these mysteries by escaping with an enthusiast to the immense hospital, there to bask in the sunlight of science.

The hospital was no exception to all that I saw in Brazil. It was large, well-built, airy, and its patios and gardens were filled with flowers and trees, fountains and walks. Never before had I seen anything so beautiful in connection with a lazaretto. Moreover, not only was everything gay and pretty, but clean and comfortable as well. When one reflects on the word "hospital" and connects it with its true meaning expressed by the Spanish as *hospitalario*, or

hospitable, one feels that they carry out the root-meaning who prepare a refuge for the unfortunate in these splendid establishments with high ceilings, polished hardwood floors, tiled wainscoting in light buffs, blues, and white, and with the smiling face of Nature peering in at every wide-flung window.

And now those strange diseases called tropical were displayed to me. Altogether, I saw fifty-six cases of leishmaniasis. This is the American expression of the horrible Aleppo boil of the Orient, cases of which used to throng the streets of Damascus and which, thanks to the British, are no longer believed to be a mysterious scourge of an enraged God, but simply evidences of the invasion of the human body by pear-shaped organisms thronging the white blood corpuscles.

Dr. Octavio Torres, my guide, told me that the disease was apt first to attack the skin of the legs and face. He showed me a number of cases presenting from five to twenty scars, alabaster white in contrast to the native hue of the patient. So far, the question was simply one of an extremely disagreeable skin affection.

But now begins the real tragedy. Suddenly, what is apparently a heavy nasal cold develops into a mutilating affection of the nasal structures; the cartilages are dissolved, the nose caves in, the nasal cavities open wide, allowing a clear view of the roof of the throat, a harelip tone of voice takes the place of clear enunciation—and then at last the patient runs to the doctor. All too frequently, however, the damage does not stop at this point; dissolution of the cartilages of the larynx takes place, the vocal cords are destroyed, and contracting scars narrow the windpipe so that not only is the voice lost, but asphyxia also threatens, and a hurried operation has to be done to admit air, as in diphtheria of the old days when no saving serum existed.

The outstanding feature of this terrible disease is its exceedingly rapid progress. The only treatment known so far, and somewhat dangerous in itself, is the intravenous injection of tartar emetic. While prompt improvement generally is noted, Dr. Torres showed me one case which had received two hundred such injections without cure. So far, leishmaniasis seems to be limited to the forests of Brazil and adjoining countries. I have looked long and patiently for traces of it in the prevalent leg ulcer of Puerto Rico, but so far have never found it. The worst of it is that, even where it is most prevalent, and even in the most dreadful cases, the finding of the organism is difficult and requires painstaking search.

The next stranger to my medical life was the ulcerating granuloma of the pudenda. This most revolting disease attacks the external genitals, first destroying them as if by magic through rapid ulceration, and then creeping up over the abdomen, back over the buttocks, and down over the thighs. I saw a case which was just one mighty, foul-smelling, suppurating ulcer extending from the chest to the knees.

This affection is caused by an organism which then had been discovered only a few years before by Gaspar Vianna, that brilliant young man cut down in his early thirties. Although the scientific world does not yet accept Vianna's organism as the cause of these ulcerations, there is not the slightest doubt but that the influence of tartar emetic by intravenous injection upon the manifestation of this disease is strikingly specific. I have seen too many cases cured by only a few such injections to have the slightest misgiving on this point. The cities of Brazil seem to be scourged by *ulcera pudendum* which, in reality, is venereal in origin. Here is an affection which does exist in Puerto Rico, where in times past it was confused with chancroid. However, in

the renaissance which of late years has placed the medical profession of our Island in the very front rank of American tropical medicine, *ulcera pudendum* has been revealed in a few cases by our group of genito-urologists.

Next, I saw two genuine cases of *goundou*, a real African equatorial disease. This is a symmetrical bone-hard tumor, which may reach the size of a pigeon's egg, on the sides of the nose just below the inner corner of the eye. Its treatment is surgical.

Finally, I was shown a case of *piedra*, a fungus disease of the hair, to which it imparts various colours according to the organisms which liberate the toxins. The hair is studded with little nodules which are somewhat softish, and the significance of *piedra* as a disease naturally is æsthetic.

There was no time for more. In the brief space of an hour and a half I had been permitted to draw the essence of what I wanted from this vast hospital, and my guide was ideal for the purpose, for he himself had devoted his entire life to the investigation of tropical diseases.

We now rejoined the rest of the faculty and the other two members of the Commission, and visited the maternity hospital only a stone's throw away. One could think of the luxury and elegance of some Petronius in a far-away Roman tropical province, as one gazed on this architecturally perfect specimen of a Sevillean home with beautifully tiled interior courts ornate with flowering plants and spotlessly clean. The ventilation was perfect, light flooded the ample high-ceilinged wards, everything looked new, and there was a pervasive air of stability and good taste. It was amply supplied with tiled baths, and had three operating tables, one for obstetrical surgery, one for forceps cases and minor operations, and the last for the delivery of normal cases.

These details are given simply in cross section of that

hygienic culture which, in the cities of Brazil, heaps upon the sick, the suffering, and the depressed all the beauty of nature, art, and science combined.

2

We docked in Río at dawn three days later. We were met at the landing by a number of influential gentlemen, many of whom were to play an important part in the working out of our difficult problem. Representing the Department of Health was Dr. Carlos Seidl, the Director, and his high-ranking assistants. The Instituto Oswaldo Cruz was there in the persons of Dr. Adolfo Lutz and Dr. Figueireido Vasconcellos. Two Medical Officers of the Army represented the Surgeon-General. And finally, the Minister of Foreign Relations of Brazil and the American Embassy each had sent their representatives.

We chose as our stopping-place a lovely little hotel situated on a shelf up the side of the towering Corcovado, a mountain covered with the richest green of Brazil's forests, primeval yet tamed, the forest park of Tijuca. Thence the eye swept over the bay, the magnificent city far below us, and the semi-circle of mountains, wooded to the top, which enclosed this paradise—the gateway to a country as large as the whole of the United States, yet almost untouched in its fastnesses.

Now the object of our Commission, as conceived in New York, was threefold: first, a demonstration to the Brazilians of the advantage of the field dispensary as a means of getting in closer touch with the agricultural labourer; second, the obtaining of information pertinent to the scope of future work by the International Health Board in Brazil, and the drawing-up of a feasible coöperative working plan; and third, an investigation of the state of Brazilian medical edu-

cation. This programme necessitated, of course, that the members of the Commission should work in more or less complete isolation from one another. The first mission was accomplished by myself, and carried me far to the north into the State of Minas Geraes; the second required Dr. Ferrell's concentration in the capital, with occasional journeys into various parts of the state; and the third provided an intensely active survey of all of the medical schools and centers of learning in the entire Republic. This fell to Dr. Pearce. And it was only on the completion of these three specific problems that we met again.

Naturally, my first visit was to the Director of Public Health. His was a curious attitude. He was not very sure but what our visit might be an infringement upon the dignity of Brazil. Moreover, he was an Austrian by birth, this was 1916, and the people of the United States had at last begun to show their sympathies in the world conflict.

But I was very frank with him. I told him that my mission was to make a preliminary study of Brazil's necessities in its struggle against the invasion of disease, whereafter the Rockefeller Foundation would offer to help financially, scientifically, and morally. That in order to accomplish this survey, I had brought with me a full equipment prepared to meet any emergency, medical or surgical, as well as to study under field conditions those scientific questions which, without certain laboratory equipment, could not be accomplished. Furthermore, that I hoped to be able to demonstrate that this equipment which I had brought could be multiplied indefinitely, and thus form a link between the scene of the labourer's initial manifestation of disease and the big city hospital.

From some of his remarks prior to this explanation, it had begun to look as if those five tons of medical equipment were condemned to return unused to Mr. Rockefeller.

But now Dr. Seidl's face brightened, as he said: "Why, then, all that you need from me is my moral support to a medical expedition for an investigation of tropical diseases; and I will give you a letter to Oswaldo Cruz, into whose province this falls."

I was glad that the suggestion came from him, for it was precisely what I had been working up to. So I replied: "Of course, I have an axe to grind myself, as I presume you have; and my axe is no concealed weapon. My aspirations are entirely within science. I am not in the confidence of our State Department. However, if there were any deep-lying intention of interfering with or belittling the Brazilian people in their efforts to sanitize their own country, I would be a dangerous man to select for the mission before me; because I frankly tell you that my sympathies have always been with the Latin-American people in their struggle to preserve their personality. While I do not know any of the political phases in the relation between Brazil and the United States, I do happen to know that Mr. Rockefeller's Foundation is anxious to achieve a reputation for disinterested philanthropy in medicine. As far as our respective governments are concerned, I think that we can safely trust them to tell us where to stop. So let's be friends in science, which recognizes no patria save its own, and we shall find ourselves friends in every other sense."

This laid the foundation for a genuine friendship between myself and the Director of Public Health in Brazil, and thus I came to knock at the gates of the Oswaldo Cruz Institute.

On many occasions in my life, I have been aware of the emanations of what we call "personality." It requires a sixth sense to receive these messages, unspoken and yet more eloquent than words. Oswaldo Cruz was really a very great man. He had never known failure; and when

his grateful countrymen created for him a magnificent palace in which to work out new secrets of Medical Science, when they put him reverently above all other patriots and named streets after him and placed weighty decisions in his hands, then, instead of vain flattery, he saw in it only additional responsibility, and became a more and more humble servant of science and of the great undeveloped land which will some day be the refuge of humanity stifled elsewhere. Oswaldo was exceedingly handsome, too, but totally unaware of it. His regular features traced the lines of Greek beauty, and he had fine friendly brown eyes and a great shock of white hair.

After listening attentively to all that I had to say, he enthusiastically welcomed my entire programme with the crisp words: "You can count on this Institute and myself to make this a success. If you have no other plans, I would suggest that you send your equipment at the earliest possible moment to Bello Horizonte, and thence tranship to Capella Nova where we have a sub-station of the Institute for the study of trypanosomiasis and other diseases. I will send with you our best men, Professor Lutz, Professor Chagas, and their assistants, and will later join you myself."

I must apologize if I speak of "Oswaldo" and not Oswaldo Cruz; for in Brazil, familiar feeling is so strong that one does not speak of Mr. or Dr. Cruz, but simply of Oswaldo. Before long, in fact, I myself was popularly referred to as "Bailey"—or sounds to that effect.

Lutz, too, instantly became my friend—a phenomenon which Oswaldo told me later greatly impressed him. Lutz is about the most perfect pessimist whom it has ever been my privilege to meet, yet beneath a rough exterior he has a heart of pure kindness and a spirit alive to scientific adventure. He is the only one of that group who still keeps

in touch with me and, in his venerable age, he writes with the vigour of youth about new flights into the unknown.

The third musketeer was Carlos Chagas, totally different from the other two, a small, slightly built man, with light brown wavy hair and blue eyes. I afterwards found out that Chagas was the idealist, the orator.

We all had lunch together in Spartan simplicity, and it was decided that while I was waiting for the arrival of the rest of my equipment, I should gain time by a careful survey of the medical activities and institutions of Río. My first visit was made to the Oswaldo Cruz Institute itself, a superb Turkish palace, its minaret towers topped with the familiar bubble-dome. Here I made the acquaintance, under the tutelage of Dr. Chagas, of the dreaded trypanosomiasis, American edition of Africa's sleeping sickness, save that, as previously stated, in this case dementia, and not eternal sleep, is the end product.

Trypanosomiasis is caused by a small parasite with butterfly activity, in one of its phases found in the circulating blood, but in its other, more deadly phase in the internal organs—especially the thyroid gland and the heart muscle. In Africa, the *Trypanosoma* which causes sleeping sickness is carried to man from animals, chiefly the antelope, by the tsetse fly. In South America, however, it is carried by an uncouth, dark, cricketlike insect called the *Triatoma megistum* or *Conorhinus megistus* (its discarded title) by whose bite the tiny blood parasite, the size of a malarial organism, enters the blood stream.

It was amusing to watch Carlos Chagas, as he talked on the deadly nature of that bite, the while a whole tribe of those big insects, which he had deliberately infected by allowing them to suck the blood of an infant with the disease, crawled sluggishly over the glass top of the handsome mahogany table upon which his hand carelessly

rested. Every now and then, without stopping or even modulating his voice, when some over-curious bug would stray too far from the fold and near the edge of the table, he would quietly reach out and drop it back in the centre, knowing perfectly well that if one of them should take it into its head to bite him, it would infallibly introduce the deadly organism into his blood. It was only when he showed me the enormous heart of a human victim, and under the microscope the riddling of its substance with untold millions of these *Trypanosomata*, that I fully realized the deadly nature of this tropical affection. It has not been found north of Venezuela as yet; but in certain parts of Brazil it is the constant nightmare of mothers, for unhappily the *Conorhinus* prefers the tender flesh of infants.

Chagas also produced a marvellous collection of specimens of yaws, first cousin to syphilis. Yaws is a loathsome skin affection caused by a queer corkscrewlike organism similar to, but readily distinguishable by an expert from the one causing the latter disease; and like syphilis, it is curable by salvarsan and its derivatives. Yaws was a disease just then disappearing from Puerto Rico, but still holding a few scattered castles in the fastnesses of the mountains, and so I was intensely interested to find a country where it took a leading part in medical geography.

To lead one through corridor after corridor, salon after salon, museum after museum of the hospitals and clinics of this great city would be almost as tiresome as the physical exercise I undertook in making my survey. But a few things of interest may be mentioned. In medicine as in architecture, in horticulture and parks, in the habits of the people and their literary tastes, in their very outlook on life, the Portuguese-speaking Americans of Brazil, isolated from us by great distance, by language, and by race, are practically untouched by what we are pleased to call

“Americanism.” In common with all South America, they are amused at, if they do not actually resent, the self-satisfaction of a people who deny to Latin-Americans the right to call themselves Americans unless they are born north of the Rio Grande. Yet here is a great civilization, purely Latin-American, which affords practically all the comforts of modern life as we know it, in addition to others which by climate are denied us.

In respect of community medicine, Brazilian cultural development is perhaps in advance of our own. Take for example the great medical centre not only of Río Janeiro, but of all Brazil—La Santa Casa da Misericordia. I found that this vast institution, with its 1,400 beds and its Children’s Hospital, was the mother and inspiration of all the little clinics and hospitals of the capital city. Its visiting physicians were the great, the successful, the wealthy practitioners of Río de Janeiro. Moreover, they constituted the Faculty of the Medical School; and there they spent a third or a half of their time in scientific investigation, like one great priesthood.

There were no heavy hospital odours in the Santa Casa, nor was there any undue noise, and every ward and its dependencies were filled in the morning with respectful students and enthusiastic professors; in the afternoon, with the murmur of visiting relatives and friends. Again, it was very clean and orderly, and the records were scrupulously kept. But the interesting feature of this huge hospital was the way Medical Science had blended there with medical practice. Every ward had its little clinical laboratory, and there were a number of X-ray installations. I did not find one man of the staff who was not thoroughly alive to the advances being made in modern medicine, or who failed to use all the laboratory expedients for diagnosis. Not only

this, but every man was an investigator at the same time that he was a practitioner.

There I met Magalhães, in practice a surgeon but known to Medical Science as a mycologist—a student of fungi. Mycology was his hobby, and he had become a great authority on madura foot, that queer invasion of the human body by plants. It seemingly made no difference to Magalhães, the enthusiastic mycologist, that the only treatment for these feet was to cut them off. But it must have been plain to him, as a surgeon, that here amputation was no treatment at all, but only a shocking acknowledgment that the science of medicine was still too backward to cope with so despicable a thing as this tiny microscopic climbing vine, which wended its way peacefully through human flesh and permanently disabled it. And so Magalhães' laboratory was both a laboratory for clinical use and a bright spot for scientific investigation—a little shop wherein were elaborated new notions of disease.

I was especially pleased to find that no one had as yet made it impossible by an excessive tariff, as in our country, for these Brazilian scientists to get the best microscopes and instruments of precision for their vital work. The Government had not decreed that they should sacrifice their vain desire to excel in science—not to mention the lives of their patients—in order to protect an infant home-industry. In Brazil, one could get a Zeiss or a Leitz microscope, or some French instrument, without having to pay tribute as we do, in scientific labour wasted and in our hard-earned money, for the upbuilding of some venal laboratory equipment house.

The last institution which I inspected in Río was new to me, as it will be to the readers of these memoirs. The dramatic events which culminated in the extinction of yellow fever, and, for the Brazilian populace, the no less dra-

matic conquest of modern Medical Science over other communicable diseases, is responsible there for the most militant expression of state medicine that I have ever seen: the Bureau of Disinfection of the Sanitary Service. Dr. Graça Couto was the heart and soul of this Bureau. He had organized a disinfecting service on the principle of a fire department, and everyone under him charged out into the street at a gallop the minute anything had to be disinfected. It would have been comic, had it not been so extremely efficient. Were I to try to reconstruct Peter the Hermit, I believe that I would take Couto for a model of that man who upset a whole world.

The plant I visited was the headquarters of one of the municipal sanitary districts for disinfection. Here was no elegance or landscape gardening. The grounds were large, although the building was not; and they were surrounded by a high brick wall to keep out the prying eyes of the curious. Within those four walls, and facing an immense patio, were vehicles, incredible in number and variety, to be used in the disinfection of houses and sewers, in the draining of stagnant waters and the oiling of fountains and cisterns. There were 480 mules stabled under sheds, on cobblestone floors without straw; and there were still more vehicles under another shed. Among these were large autoclaves, mounted on wheels, for the sterilization in front of houses of articles belonging thereto; steam sterilizers, and flowing steam sterilizers from which the sterilizing chemical is carried in the form of gas through a hose into the house; a huge Clayton sulphur-dioxide apparatus for the fumigation of sewers and cellars; mortuary wagons; patrol wagons; wagons to take the family of the infected to quarantine; ambulances for the patient; wagons to return clean clothing; buggies for inspectors—and an automobile for the chief.

When a case of infectious disease occurs in Río de Janeiro—even measles or whooping cough—the doctor is obliged to notify one of these depots by telephone. If he doesn't, he is both fined and imprisoned. Instantly, the gates of this corral are thrown open, and in grandiose style, and with an enormous amount of clattering and jangling of imposing apparatus, Río is treated to a glorified fire-call. Immediately upon arriving at the house, uniformed disinfectors fly up the stairs two steps at a time and "take charge of the situation." First, the patient is seized and bundled off in an ambulance to the Quarantine Department. Directly to follow are the protesting family, cooks, servant maids, and so forth. Then hamper after hamper of clothing, and of anything else on which dust might have rested but which cannot be wiped with the more or less corrosive chemical disinfectants, is dragged downstairs and hastily jammed into the appropriate wagon, which straightway clatters off. Next comes the disinfection of the rooms by formalin or sulphur gas, introduced through a long fire hose which is pulled up outside in full view of the populace. And finally, when all is desolation, a huge placard is pasted on the door stating that no person for any purpose whatsoever shall enter this house until the ban is removed, on pain of all sorts of sudden death and torture. This is sanitary service with a vengeance; and all is done to the *compás* of one of Bach's fugues.

By the time I had finished my survey of Río's medical and surgical arrangements, I had learned my lesson: we had very little to teach them about the care of their sick. However, none of this magnificence reached the poor laborer out in the forest, in the fields of cotton and sugar cane. What we could do now came out with startling clearness. Decidedly, our great mission was to take the benefits of modern Medical Science out to the man who

paid for the luxury of this splendid city and others like it in Brazil. Quite apart from the fact that the prosperity of these very cities depended largely upon the health of the agricultural labourer, humanity demanded that some block should be introduced to check the steady stream of sick who, by the time they made their painful way to the city, had generally reached the stage where a cure was impossible.

That block was the modernized country dispensary; and there it lay on the wharf, waiting for me to take it out into the country, to set it up, to show what it could do, and then go home to Puerto Rico and await developments.

3

It was Carnival time in Brazil, and for ten days or two weeks all work that could be stopped was stopped. Dr. Seidl laughed at my expectation of loading my dispensary on a car or two and carrying it up to Capella Nova in such a time as this. "Why," said he, "if the President of Brazil himself should go down in person and order those stevedores to work in Carnival time, they would mob him."

"Well," I said, "give me the order anyway."

However, I resolved to have one more fling before I left Río for the stern business before me, and so I accepted the invitation of a prominent citizen to watch the Carnival parade. The whole of Río was in the streets, and I think that most of it had collected on the principal avenue, Río Branco. It was a cool balmy night, and the trees, of which there were four dense lines, shone green in the galaxy of lights that ran clear down to the water's edge and clear up to the little hill on which was perched a replica of Paris' Grand Opera House. Up one side streamed a procession of automobiles, to double on itself at the Opera and float down

the other side. Around and around they went, throwing confetti and bonbons which the street urchins eagerly picked up and ate until they seemed ready to burst. Dignity was thrown to the winds. Everybody shouted or sang or orated just as the spirit moved him. I still have in my mind's eye a well-dressed gentleman who, while having his boots blacked, suddenly stood up in a commanding attitude and addressed the passing crowd on the virtues and vices of political candidates of the day. That he had no audience made not the slightest difference to him.

The highest ambition of Brazilian families in Carnival time was to convert their automobiles into floats, and they vied with one another in allegory and plain fun. One of the best historical floats represented the assassination of Julius Cæsar at the moment when Brutus was delivering the fatal dagger thrust. As the tableau of the dying Cæsar swept majestically past the spot where we were looking on, the height of tragedy came face to face with the very spirit of Carnival reflected in the swaying mass of light-hearted carousers. One of them, a perfectly ridiculous figure with a fixed inane smile given him by his mask, sprang forward just as the procession brought to a halt the float, and squirted the unfortunate Roman full in the eye with one of those devilish little perfumed ether squirt-guns.

Can you imagine Julius Cæsar, just as he was tragically gargling an "*Et tu, Brute,*" getting it right smack in the eye with ether flavoured with geranium? Even Brutus looked sorry for him, as he writhed in real anguish, and was moved to give him time to quench the flood of one-sided tears before delivering the historic final jab.

And thus sparkled Carnival, everyone exaggerating whatever he had to exaggerate. Out on the sidewalk was the great mass who owned no automobiles, relics, or jewels to parade, but who had saved enough to buy masks, and

some cheap perfumery with which to squirt at anyone who took their fancy. They shouted at the passing rich, and the passing rich shouted back at them with charming camaraderie, but of the two it was hard to tell which was the happier. Of course, there were people who were a little drunk, but that made no special difference, because everyone was more or less intoxicated with the Carnival season alone. Besides, nobody wanted to spoil a pleasant evening by a vulgar row; for Latins prefer to be just plain cheerful and, above all, noisy.

We bumped up the avenue toward the theatre, the crowd getting thicker and more hilarious as we went, but going upstream against the downstream current was a slow process, and we were held up constantly, so that interested passers-by could exchange a few pleasantries with us. On one occasion I was seized by two buxom lassies with plantation-negro faces of cardboard, and was roundly kissed with shouts of, "*O branco meo!*" (O my nice white boy!). Now the pasteboard kiss of Río is somewhat disappointing in itself, but is considerably mitigated by the very real embrace that accompanies it.

It must have been two o'clock in the morning when we finally reached our goal, and we were not even tired. Under the Opera House was a subterranean restaurant called the Assyrian Café. It was planned by a Brazilian who had never in his life been outside of Río de Janeiro. But whether it was really Assyrian or not, it looked so to us, as it did to the Brazilian crowd; and what more could one ask? It was a mighty cavern chiselled out of stone; and along its walls stood giant figures of bewhiskered Orientals supporting the rafters on their broad shoulders. I nabbed a table in the nick of time for myself and our party of four, took a long breath, and looked around.

At a couple of arms' lengths was a lone Frenchman who

had reached the point of standing on his chair and addressing the assembled multitude, not three per cent of whom could understand a word he said. A German, however, some distance away, seemed to gather the burden of his remarks and undertook to place *his* side of the question in evidence. The result was loud, but nothing came of it, and they wound up by sharing the table between them with every proof of undying affection, war or no war.

Suddenly, a bugle call split the air from the direction of the vestibule. There, grouped on the oval landing between the two flights of stairs leading down from the entrance, was a tableau of some hundred actors representing the landing of Columbus, perfect in every detail. The only note of irrelevance—doubtless involuntary—was seen in the two priests standing on either side of the Discoverer, each with his crucifix in one uplifted hand and an extra magnum of champagne in the other. Soon the actors mingled with the throng below, and when we left the Assyrian Café it was just at the turn of dawn.

Strange to say, dawn did not bring either weariness or desire to evade the plan made days before. After a hasty breakfast, I found myself speeding down to the water's edge where lay my five tons of rural dispensary. I had resolved to collect my own crowd for loading it on to the car. I wandered about, picking up groups here and there and winning their astonished admiration by my use of Portuguese. It was not very long before everyone was working and laughing. The customs house official could not get over it. To think that a lone *Americano* had been able to do what not many native sons, *filhos do paiz*, could have done, moved him to ask what I was paying them. I told him about one-third more than they would get in normal times. He was astounded, and said: "I would have had to pay them twice or maybe three times as much."

“But,” I said to him, “you are a *filho do paiz*. I am an interesting curiosity. They would pay *me*, simply to hear me talk. They probably think that a munificent government has hired me to come and amuse them, as part of the Carnival.”

But whatever the reason, that car was promptly and cheerfully loaded. Not one thing was broken, and everyone went away singing “*O, meu boi morio!*” (*O, my cow has gone and died!*)—the popular song of that Carnival season.

Chapter XI

I

NEVER in the memory of living man had there been such a rainy season. It had rained and rained for weeks, and now it was raining again. With a feeling that I must not let my freight car out of sight, I had reserved a compartment for myself and my companions in the same train which was to take it up the ascent to Bello Horizonte, the capital of Minas Geraes. It was a good thing that I had, because the train chief kept trying to cut out my precious freight at every siding, on the plea that by adding another car to his train the engine would not be able to make the grade. However, I paid him liberally at every qualm of his conscience; and the ugly duckling rolled on.

All went well enough, until we reached the border of the State of Minas. The ancient capital of that state, Juiz da Fora, was receiving the one final douche needed fairly to dissolve it, and the dissolution began with the bridge leading out from the city toward our destination, far up on the plateau where the new capital lay.

Juiz da Fora had ceased to be the capital of Minas for only one reason: it was too near Río de Janeiro, the federal capital, and it naïvely said so, whereat the government impetuously rushed two or three hundred miles away into the brush and laid out a city fit to be the capital not merely of Minas but of all South America. It seems that away up yonder there existed two little hamlets within a hundred miles of each other. One was named Bello Horizonte, the

other Capella Nova; and it was Bello Horizonte which was chosen. On this egg the self-exiled government virtually sat until it hatched, and lo, in an incredibly short time there sprang into being a heavily gilded granite presidential mansion, a no less gorgeous Capitol for the Congress, and an infinity of streets, with embryo parks, leading past cow trails far into the country.

Into the bereaved Juiz da Fora we went, dripping wet, and in mournful sympathy with this damp ex-capital. We had planned no stop there, but a defective bridge is a mighty good argument. Early the next day we were waited upon by a committee of somewhat depressed-looking officials, and by representatives of the medical fraternity. A perfectly terrific programme was arranged by which we were to visit the abandoned capitol, now become a consistorial palace for the municipality, all of the hospitals, in which we were supposed to show a fatherly interest, and then take a drive through the suburbs (it was still raining) to view the cemetery, which was said to be very fine.

We got on quite well until about three in the afternoon, when it became evident even to the most callous of our kind-hearted hosts that we were nearing a state of exhaustion. So, by eliminating the abattoir, a handful of churches, and a hospital whose staff belonged not to the party in power, we were treated, by way of reviving our failing enthusiasm, to a long visit to the house of the Anti-Tuberculosis League.

The name of this remarkable establishment was the Instituto Pasteur; and the architect who built it must have taken for his scale-model a gingerbread birthday cake lavishly decorated with coloured sugar frosting. Our guide here was a nervous little man with a solemn cadaverous face and the ponderous eloquence and manner of Dickens' Mr. Pott of the Eatanswill *Gazette*. The energy, the

illimitable faith in the impossible, of my solemn-faced friend were beautifully demonstrated in this plant. Although the town had but 35,000 inhabitants, there was, for example, the building of the League. This edifice was of granite, tiled, and had immense and expensively fitted laboratories, a reading-room, a *salon de actas*, or, literally, a hall for the taking of resolutions, a clinic-room for the populace, and so forth. Only three hundred people a year attended this clinic, of whom but seventy-one were found to be tubercular; yet there was a doctor constantly on duty between noon and four p.m. My guide informed me—and from the way he looked at me, I concluded that it might cost me my life to contradict him—that by his method, which included the use of a tuberculin of German make, practically every case could be cured.

He seemed especially proud because there was a separate building for disinfection of the clothing of the tuberculous. The disinfecter was an enormous through-the-wall Frazier autoclave. I asked the solemn dictator if his patients turned over their clothing regularly to the steam laundry for sterilization. He looked at me sadly and remarked that, inasmuch as he had found that the population of this world consisted mainly of fools, the laundry had never yet been able to get sufficient clothes to permit of its operation.

He showed us next a long line of dependent buildings in which were cowpox stables for the production of smallpox vaccine. Right behind them—practically under the same roof—was a set of laboratories for the manufacture of anti-rabic spinal cord emulsions! All was very modern and clean, of course; but the mere thought of what might happen—and what one day would happen—if these two viruses got mixed, the smallpox and the hydrophobic together, upon one single vaccine point, was frightful enough to sat-

isfy the most avid sensationalist. Theoretically, it should have been impossible to transfer the ultramicroscopic cause of one disease into the breeding place of another and worse scourge of poor stupid humanity. The solemn little doctor assured me, therefore, not only that it never had occurred, but that it couldn't possibly occur! He added, with enthusiasm: "I have sixteen people under anti-rabic treatment right now!"

I burst out, naturally: "Good God! have you such a tremendous amount of hydrophobia as all that here?"

"Yes and no," he replied with an air of great wisdom. "I make it a point to submit all persons bitten by animals to the hydrophobia inoculations which, although rather tedious, are simple and entirely innocuous."

This beat any progressive doctrine that I had ever encountered. To call the most delicate and dangerous artificial immunization known to Medical Science "simple," "entirely innocuous" . . . !

At an unearthly hour the next morning, we took up our journey again toward Bello Horizonte. We reached the mushroom capital of Minas at dusk, and were met by the usual committee of prominent citizens and physicians; but it is all a blank. I was too tired to single out any one of them, and sank into unconsciousness after a heavy meal at Bello Horizonte's most popular hotel.

2

The next day, after more winding among hills and across swollen rivers, we arrived at Capella Nova. The name, of course, means "New Chapel." It had been applied to one of those rings of silly little huts, such as spring up around any new institution in the country, whether a chapel or a dance hall. That particular village had been *nova* two hun-

dred years ago; and it still was just as *nova* the day we reached it.

We were met at the railway platform by a minion of the Oswaldo Cruz Institute. He had been left there as janitor in charge of a neat little pine-wood structure painted a celestial blue, with an enormous yellow star shaped like an octopus over the gable. The janitor met us smiling, and for a moment we thought this pleasant. However, we recalled at once that this was an involuntary characteristic of many inhabitants of the region. They were always smiling; nor would the smile come off the face of such a Capella Novite—for the simple reason that he had long since become heavily infected, from the bite of the *Conorhinus*, with the sleeping-sickness of Brazil—in which, as I have pointed out, the victim lapses into dementia. The affability of a dement is too familiar to need elaboration here.

But when the door was thrown open, and I saw the nice clean bed with its pretty coverlet and espied in the distance a shower bath and a little garden, even I smiled. The smile promptly froze, however, when I reflected upon what the natives might think of me.

“We are so glad to see you,” said the janitor. And everybody smiled. “We had a doctor up here, but he was only able to stay a very short while.”

“Why couldn’t he stay?” I asked.

“He got that sickness they get from the barbeiro, and now he’s dying in Río.”

Barbeiro (barber) was the local term for the *Conorhinus*.

Just at that moment my eye caught an animate object crawling up the leg of the bed whereon I was to lay my weary limbs that night; crawling up, yea, even to disappear beneath the pretty coverlet. Now I had seen one

tribe of *Conorhinus*; an insect with far too many legs; a curious, prying, not to say intrusive, creation of the Almighty. Only a short while in Chagas' laboratory with my entire attention concentrated on that handsome mahogany table and its wriggling, crawling burden of *Conorhinuses*, had fixed a picture indelibly on my mind.

I thought of the humanitarian little doctor who spent a week here and then went back to Río to die of trypanosomiasis.

I think I went white, but I don't know. The janitor, at any rate, remained unperturbed, complacent and, as always, smiling. Inadequately, I cleared my throat and remarked, in my sternest military manner:

"This is very nice for gentlemen bacteriologists to sleep in, but I am a rough soldier, and I have brought with me a tent hospital with beds and everything. I propose to do something new here in Capella Nova, *nova* though it be. I propose to treat these wretched people out in the country where they belong, and not subject them to visiting the *Conorhinus* in its home town!"

There was plenty of decision in what I said. The janitor, of course, smiled agreeably; but my assistants didn't smile. They thought only of the rain pattering dolefully on the roof; and they knew not, and do not know to this day, why their chief had this sudden burst of militarism. But for all my decisive manner, the rain compelled us to sleep three nights under that roof—though in our military cots—while our tent-houses were going up on a little elevation beside the railroad track a good mile and a half from the smiling town of Capella Nova.

For five days the feverish construction and arrangement of our well-thought-out dispensary consumed all of our time. Here in this remote country, not more than fifty miles from savage tribes of Indians, we set up our double

tent-hospital for the reception of our patients, emergency operations, and the dispensing of drugs, and our single tent-house for sleeping quarters. Little by little, despite the fact that we had announced a definite opening day, patients began to filter in, at first timidly and in small numbers, and then in a steady stream. These sick people had to traverse seemingly impossible distances in order to see us. When it is borne in mind that, where we were working, not over twenty and generally less than ten people per square mile constituted the density of population, and that the use of handcars on the railroad tracks had made the building of rural roads unnecessary, it will be understood that very soon we were draining an area much larger than was customary in our Puerto Rican country work.

It always takes a month to get a rural dispensary to work at its full capacity. People come slowly at first. But in a month the good effect of the dispensary is noted. Its reputation is made, and then everybody piles in. When we were closing, we found that we were inscribing from seventy-five to a hundred people daily, and were drawing on the population up to twenty-five miles away.

Throughout our work, we were aided by the personal presence and assistance of a Mr. Gravatá, an enormous man, florid and jolly. There was nothing that he would not do for us. He owned Capella Nova; and he saw from the very first what this expedition meant to his town. He had our latrines dug; he joined us up with the general electric supply from the falls some miles away; he built a large waiting-shed to shelter our patients from the heavy downpour.

On all save five days of our stay, the rain fell in torrents, swelling rivers, carrying away bridges, destroying railroad embankments, and yielding a rainfall unprecedented in this state for ten years. Nevertheless, in a period of twenty-

two days we treated 1,435 patients, representing over 3,000 visits. The explanation for this is that the people, who never had had a regular physician, now found themselves attentively listened to. They found, also, that we were prepared to treat them for whatever they had; and they discovered that we were as much interested in making a success of our work, and in taking to heart their little tragedies, as they were in obtaining relief.

It was just as I had expected that it would be: hookworm infestations were frequent, constituting about seventy per cent of the population; but these infestations were light, not over sixty worms per individual. There were too few people to infest the soil heavily, and most of our patients were "carriers," or persons carrying the worm in such small numbers as not to constitute a case of hookworm disease.

But it was not so of other diseases peculiar to this area. Of trypanosomiasis we had 105 cases, mostly from the town of Capella Nova. There was a tremendously important aspect of this sleeping sickness which no amount of talk could have made me believe until I understood how reasonable it was from seeing the conditions under which these people lived. The real way to get rid of trypanosomiasis is, in the last analysis, the same as in bubonic plague. It has to be built out. The *Conorhinus* lives in the cracks of the mud-constructed huts, and sallies forth at night to bite its victims. If the houses were constructed of cement or even of wood, there would be no endemic trypanosomiasis. I extracted the most interesting history of Bello Horizonte and Capella Nova from an old timer, a German engineer who had charge of most of the railroad construction in that section. He said that these two towns were the most heavily scourged by trypanosomiasis of any in Brazil, and that when the government decided to seize upon Bello

Horizonte as their future capital, they practically razed to the ground all of the little mud hut constructions and built in cement, wood, and brick. The result was that in a trice trypanosomiasis totally disappeared from Bello Horizonte, and has never been seen there since. Poor little Capella Nova, of course, still harbours its high quota of cases, chiefly among its poor.

Of leishmaniasis we had plenty of cases, and of leprosy a shocking number. Many a time did I have to sit alongside a leper who had deposited himself nonchalantly upon my bed, and take his history on my knee. And many a time did I have to introduce the most revolting cases of ulcera pudendum and strange fungus diseases of the skin into our improvised dining-room at the end of our dispensary.

It was not long before dear old Lutz showed his worth, not only as a scientist but also as a great physician. One stormy night there came a scratching at our tent flap. We were all exhausted, and it must have been one o'clock in the morning. I called out to Lutz and my two young assistants, loaned me from the Faculty of Medicine of Bello Horizonte, please to see what was the matter, and rolled over on my side to sleep again. We woke to find that Lutz had disappeared. It seems that a poor wretched woman had come to beg the *doutores Americanos* to see her daughter, who had been in labour for three days and was fast playing out. But it was not the young fry that went. It was the old man who spent the night in doing a difficult "version" of the child in the womb and saving the life of mother and baby. Though my conscience smote me when he came in, all spattered with mud, white, emaciated, and exhausted, yet I felt a warm thrill of pride, for here was a man of the highest standing in scientific circles who, despite long Latin names and an international reputation, was still a devoted doctor of medicine.

Toward the end of our stay—by chance on one of those five sunny days, when we had a huge clinic—in walked the President of the State of Minas Geraes. He had come up on a special train with his Cabinet, most of the medical profession of Bello Horizonte, and a Lieutenant Colonel of Infantry, his Aide-de-Camp. It is difficult for us Americans of the North to visualize a true confederation of otherwise independent states such as Brazil is to her sorrow. Every state has its president and a top-heavy cabinet, its congress, and its regular standing army—although the latter is unauthorized.

The President, an interested spectator, sat beside me while I smeared a little faecal matter from a toothpick on to a slide, dropped over the cover-glass, and focused on it with my microscope. He listened, while in execrable Portuguese I questioned my peasant patient, who sat all unconscious that he was in the presence of the chief magistrate of his people. The President then followed me about as I showed our neat equipment for diagnosis; for case records; for the medical treatment of disease, with paregoric in tablet form and castor oil in capsules; for a modern aseptic operation, with folding operating-table, and every detail of necessary accessories well and economically provided.

He could not understand, however, the necessity for an elaborate general operating case with bone saws, trephining set, tracheotomy tubes, amputating knives, and all the rest. I replied to his objection by telling him that at the close of a fine day, while I was sitting just as we were sitting then, I saw the afternoon train a mile away, hurrying to Bello Horizonte. Suddenly it gave a terrible heave and plunged headlong down the railway embankment, which evidently had been washed out by the excessive rain. Horrorstruck, I arose, snatched my portable emergency

satchel, called on everyone to follow me with litters, restoratives, and rubber bandages for stopping hemorrhages. We worked all night; and when morning came, I had the satisfaction of counting twelve wounded and contused who but for our timely provision, would have been lying about in dirty nearby huts, with everything still to do, and with a well-established infection speeding through the vessels on its gruesome way.

It was late and time to return to Bello Horizonte, but as the President took my hand he held it, looked straight in my eyes, and said:

“Tell Mr. Rockefeller that he has done at least the State of Minas Geraes a favour that it can never repay. He has shown us a defect we never knew that we had. We were not rendering aid to our people when and where they most needed it. We had not made contact with our sick and wounded at all by simply providing a palatial hospital miles away from the scene of their suffering. We don’t want his money, but this little portable dispensary will be found all over Minas Geraes as soon as ever I can get our Congress together. I promise you that. We may accept with our deepest thanks any help Mr. Rockefeller can give us apart from this, but this—this is a duty which we owe our people, and we will pay for it, too.”

3

The bridge between rural patient and city hospital had at last been provided, and Brazil would soon be crossing and re-crossing it. We had made some real friends, too; and they were not the volatile, carefree rollickers of an all-year-round Carnival—they were mountaineers.

It was our last night in Capella Nova, and we had sat down to our last meal together, some of us never to meet

again. Everything was in disorder; crates here, bags there, and confusion everywhere, but our devoted negro cook had prepared a banquet for us. We had reached the wine and the little cup of black coffee, and we had begun to feel the warm stimulus not alone of our beverages, but of that spiritual distillation which fills the hearts of men who have been faithful friends and have battled together.

All of a sudden, I heard the dull roar of a distant explosion, followed by the familiar swish and faint secondary detonations of a rocket. We ran to the door, and there a mile away we saw that Capella Nova had for some mysterious reason decided to celebrate. It did not enter my head that this was connected with us. As the faint strains of the town band were wafted our way, I asked Lutz what it meant. "Some Saint's Day, I imagine," he replied dryly. Lutz was not especially well up on Saints.

But the rockets kept exploding, and the music came nearer. We could make out a mass of people coming up the railroad track toward our "*misión*," as it was called by the Capella Novite. Within half an hour they were there at our door, some five hundred men, women and children, headed by the village priest in full regalia.

Hushed and respectful now, the crowd formed a semi-circle behind the priest. He told how we had come out of a clear sky to them; how we had brought them new ideas, new remedies, and, above all, the consolation of science; how they had wondered in what way they might show their appreciation; how they had been told that the American Army, like the Brazilian, would not allow its officers to accept presents from any government, whether state or municipal.

"But," he added, "this you can accept. This is not from a state nor a municipality. It is bought with the pennies

of many a poor soul who is your friend. This is for you from the friends you made in Capella Nova."

And he handed me a little leather case, which contained a solid gold plaque three inches by five, with one end turned down and fastened with a huge Brazilian diamond of the first water; and it bore the following inscription:

A ROCKEFELLER FOUNDATION NA PESSÔA DO SEO ESFOR-
ÇADO REPRESENTANTE DR. B. ASHFORD EM SIGNAL DE
RECONHECIMENTO PELOS BENEFICIOS RECEBIDOS OFFERECE
O PVO DA "CAPELLA NOVA DO BETIM"
ESTADO DE MINAS BRAZIL VIII-IV-MCMXVI

(To the Rockefeller Foundation in the person of its courageous Representative Dr. B. Ashford in token of gratitude for benefits received the people of Capella Nova of Betim make this offering)

Reluctantly enough, I sent this precious gift, so personal and so prized by me, to the Rockefeller Foundation, to whom it really belonged. But my good friend Rose brought the matter before the Board of Directors without any prompting on my part; and now that plaque reposes among my own little treasures, to remind me every day of a very humble tiny town in South America where I made a thousand friends in the Portuguese language.

Chapter XII

I

OUR return from Río de Janeiro was much more placid than it would have been had we known that we were being chased by a German prize converted into a scourge of British merchantmen. At last, however, we were driven incontinently into the open roadstead in front of Bridgetown, Barbados, easternmost of the Lesser Antilles, an island which had held for me up to now but one point of interest: the fact that in 1767 William Hillary, a simple English practitioner, had written from there the very first description of sprue as a clinical entity.

I eagerly sought out the District Medical Officer, who happened to be a particularly fine representative of our profession, and he told me that strangely enough he had never seen a case of sprue on the Island, nor had he ever heard of one. A bit of ætiology still stranger to me was the information that elephantiasis, which when first recognized was known as Barbados Leg, is also non-existent there to-day.

The Island was a marked contrast to the others I have visited. Here no trace of medieval Europe was to be seen, nor hint of Spanish occupation, no Sevillean patios, no Alhambra arches. It was simple English countryside, and the town was an old English village. The population, overwhelmingly black, was composed of the best representatives of the negro race I had ever seen, and surprisingly enough they spoke with an accent broader than in England.

It was a hot afternoon. Our little crowd, which had been formed on shipboard by that medical process known as agglutination and consisted of five Englishmen, myself, and a Chicagoan, seven in all, hired a victoria intended for two persons and set out for the country club, in a blinding cloud of the snow-white dust peculiar to Barbados.

We had found our steed standing bent-legged and drooping at the water's edge, the very picture of dejection. His driver was a huge negro wearing a shiny Prince Albert coat, soiled white gloves, and top hat with the fuzz rubbed the wrong way. Bill, as we re-baptized him, made no attempt to negotiate the up-grades, and it was necessary for all of us to pile out and push. But on the down-grades he had to run to save himself from being impaled by a shaft or crushed by the weight of human cargo behind him. He was barely able to stand when we reached our journey's end.

It was a pretty little club, and the exercises began with stentorian orders for "Swizzle!" I was laughed to scorn for my ignorance when I tried to find out what a swizzle was; but I did gather that this was the most notable thing Barbados had ever produced. We had one, two, or three, with the most galvanizing result it has ever been my privilege to witness or experience at any time in any country following the imbibing of any drink. Like seven wilted lilies revivified by some elixir, we rose straight up and regarded each other with re-kindled glance.

On the Chicagoan, a portly lily indeed, was produced the most astounding effect of all. To our alarm, instead of ordering another round, he bawled loudly for a champagne bucket. The waiter considered this out of precedent but finally produced one, and we breathlessly awaited developments.

"Take this," ordered the gentleman from the Middle West grandly, "and *fill* it with swizzle!"

The waiter, goggle-eyed, dared not demur, and speechless we sat and speechless observed his return with the brimming potion. Whereupon our Chicago friend majestically arose, took the pail, and, muttering something about "deserving beast," marched unsteadily but solemnly out. Almost at once there arose a tremendous commotion, and we emerged just in time to see Bill shoot by at a gallop, reins dragging the ground, victoria bouncing wildly from side to side and distributing itself piecemeal all down the road.

It seems that the Chicagoan's intention had been humane enough; but like many another humanitarian gesture, it left the benefactor a long way from town.

2

Later that year, quite by accident, I was treated to a glimpse of St. Thomas.

Now I suppose it is not easy for an active American, accustomed to familiarize himself with his neighbours and his surroundings, to understand how an inhabitant of one island in the Antilles, these stepping-stones between the Americas, should fail to visit and have lively business relations with the people who live almost within sight on the next island. But we are apt to forget our history on which traditions and customs are really based.

When Columbus first landed in San Salvador and began his pilgrimage from island to island, he little thought that few were later to follow his example. The other kingdoms of Europe rushed in behind Spain and grabbed what they could of what was left after she had taken Cuba, Hispaniola (the Haiti and Santo Domingo of to-day), and

Puerto Rico, not to speak of her big bite into the “Spanish Main,” or mainland of Central and South America.

For about two hundred years, each little island was colonized and fortified as an outlying possession of its mother country at the portal to that romantic America of an heroic age; and thenceforward the history of the Antilles was a reproduction in miniature of Europe's most intense squabbles. Whole wars were fought on tiny islands hardly large enough to allow the combatants to manœuvre without their pushing each other off into the water. It was as if Europe had decided to civilize these virgin lands by concentrating in one cautery point all of its fiery animosities and burning its path into the heart of the country. And so for years and years they fought and struggled at the gate of a new world, bringing their greed, their cynicism, their diseases, their fierce religious hatreds with them. It is true that these rich lands rendered fortunes in sugar, but what of the harvest of lives! So vile, so brutal was this patriotic hand-to-hand conflict that by contrast piracy itself appears to have been a highly honourable and gallant course.

Indeed, the buccaneers raised the first cry for that liberty which has always been the sweetest word in America. Had they been a little less greedy and cruel—or a little more united—they would be sung in poesy and recounted in history as the fathers of a glorious freedom. Unspeakably vile though their conduct was, they were actually the first to rebel against the domination of Europe over the New World.

Because, then, of the proximity of England to France, France to Spain, Denmark to Holland, each little spot of verdant land in this sapphire sea bristled with bayonets and resounded with the roar of artillery, and each foreshortened distance between Patrie and Patria was a gulf.

To this very day those of Martinique keep aloof from those of Trinidad, and those of Antigua, black though they be, cannot bear the accents of men of the same race who have lived beneath the white cross of Denmark. No, there is less intercourse between Trinidad and Puerto Rico than between Puerto Rico and New York or Canada or even the Orient. There is not, there never has been, the remotest semblance of union among the *conquistadores* of the Antilles. This disunion, our outstanding characteristic, comes down to us from the late Middle Ages.

Into these shadows of a weird past my son and I quite unexpectedly stumbled when we were invited by the Officer of the United States Revenue Cutter *Algonquin* to accompany them on a coaling expedition to the quaint old Danish stronghold of St. Thomas, in the early days lair of pirates, and even at that time refuge of deposed dictators of Latin-American republics.

So this was the famous bay of Charlotte Amalie which the United States coveted as an outpost of her Navy for the defense of the Panama Canal!—a beautiful bay backed by mountainous hills. The rakish old town rose step by step up their slopes, and they were surmounted by Black Beard's Castle and Blue Beard's Castle with its fortified crest. Straight ahead grinned hospitably the wide-piazzaed, well-shaded Grand Hotel, and to the right smirked the dinky little fort of red brick then still displaying the banner of old Denmark. A full ninety-eight per cent of the population is African—really African and not mulatto—honest negro folk with no white folks to serve, but proud of their morals and the purity of their race. And well they may be. I want no better friend than a St. Thomas negro for faithfulness and kindheartedness. We can justly be proud of them, now our own black citizens. They have self-respect. They are not “niggers.”

Long before I ever saw their island, they began pilgrimages to consult me in Puerto Rico—at first one, then by twos and threes. The first one was a middle-aged black woman, very much frightened as she had never been away from home, but simply wild to be cured of a “tumour in the belly” which she did not have. But she had other things, and of them she was cured, and I became “her doctor,” and upon me she lavished all the richness of her “mammy” soul.

Years later, in 1925, when it was published in the only newspaper she ever saw that Congress had awarded me the Distinguished Service Medal, and that the Regiment here was to confer it with military honours and a review on Morro parade, she took the first boat for Puerto Rico. Just as the last company marched by and saluted me, just as the ceremony was over and the Regiment swung up the long green to the inspiring martial notes of “Le Sambre et Meuse,” out of the throng of people bobbed a red bandanna turban that made its way tumultuously toward me, dropped a glorious old-fashioned curtsey, and showed an honest black face beneath it. Before the Colonels and Captains and Lieutenants could say her nay, she had dropped on one knee and kissed my hand, with two big tears rolling down her cheeks. This was her great experience. She writes me frequently still. Thus:

DEAR DR. ASHFORD:

I wrote you a good while I didn’t get any answer but I ask this gentleman for you and he tell me you was here and that either your sister or one of your daughters is married and I am so glad sending many congratulations for yourself and family. . . . I am so sorry I was not there like the day when you made a colonel (*she has reference to the conferring of the D.S.M. which she always insisted, practical soul, raised me in rank and pay*) I am sure that day it was like the day you was

made a colonel and grander still I have never seen nothing further than that day.

I am sending to ask you a favour this young gentleman got acquainted with E— (*her daughter*) when she was down there I don't know him nor she don't but he was introduced to her down there and he seems that he cared about her for he says he is going to correspond with her when he get home I don't know what for a person he is I know that you won't fool me for I know that you cared about your daughter you is my all in all that I could confidence in she will be 20 years tomorrow she is still a young girl she is but a child yet I won't like anyone to come and fool her I am so sorry I get acquainted with him so short for I would of send if it is only a slip for Madam.

Now Doctor I am leaving it to you I am waiting for an answer I still wants to send you a Christmas present.

Later, in a following letter:

About the gentleman you need not trouble to know him for I most think he is married and if he is he cannot marry twice he still corresponds with us but I aint have no hopes of him and I hope you will enjoy the guava-berry you must fixed it as a liquor for that is our country guava-berry that we fixes up for the season.

The "gentleman" to whom she referred was also black and very polite, and when I asked him his business, he replied:

"You can just put me down for general work, please."

But to return to our visit: there was a guest at table in the enormous dining-hall of the Grand Hotel, sitting like a fly in a pail of milk. We entered. Mutual greetings. It was our old friend, Dr. X., solitary Dane, Medical Officer of the Island, a graduate of the London School of Tropical Medicine, who once visited us in the Institute of Tropical Medicine and told us about a disease we had

rarely seen—pellagra, prevalent in St. Thomas. Each island sports even its characteristic disease or diseases.

Dr. X. was consuming a frugal repast at a neutral hour, eleven a.m.

“What do you call this meal?” we asked, “—breakfast or lunch?”

“Reahly. I hardly know meself. Porridge, coffee, an egg dropped on toast, a spot of jam, and—well, that’s all. It’s meant for breakfast, but it’s too late for breakfast, I’m afraid. I had a beastly night. Perhaps an early lunch, what?”

We agreed to call it a belated breakfast and upbraided him for his Roman luxuriousness. He immediately flew to arms.

“You think, I fahncy, that there’s nothing to do over here. Well, it is now only a month ago that I was called out in the night to see a case of being taken silent—”

“Of what?”

“Of being *taken silent*. You call it over your way “*un ataque*,” or an attack, because your patients make a hellish noise. Ours don’t. They are just taken silent. Let me explain. I had a bit of champagne supper with some German friends of mine, and they were not satisfied till about two a.m. when I retired with a nice edge on, y’see. I had no sooner put out the light and lost consciousness when someone began rapping on the blahsted door and calling in a most vulgarly loud tone of voice for the Doctor.

“I threw open the window and cried, ‘Who’s theah?’ and an African voice replied: ‘It’s Mistress Jones, sir, taken silent since nine o’clock lahst evening, sir.’ Well, I looked at my watch, and it was three in the morning. But, being a singularly good-natured and humane person, I dressed, seized my little medical kit, and followed him a few minutes later to a house where no one was silent but the vic-

tim. In your island I believe it is the victim that is noisiest—strange these differences in disease according to the geography!

“Now it is a fact that most really great discoveries in the treatment of disease have been quite fortuitous—as we say, the result of clinical instinct—what? And here I made a reahly great discovery. I had never known a feasible treatment for being taken silent. In fact, neither strychnine nor bromides had ever succeeded in my hands. But now I can safely state that not only can I instantly cure *every* case, but I actually believe I am preventing this harrowing malady, for I have not been called since to see a single case!

“I mechanically opened my kit, and there I could find only a can of ether and a hypodermic syringe *without any needle*. Mind you: a glass hypodermic syringe, no needle, no medicine, a can of ether, an audience of excited coloured folk, and three o’clock in the morning! Only under such circumstances is a man raised at times to immortal discovery. My technique is simple: you fill the syringe with ether. Then, compressing the right nostril of the patient with the left forefinger, and introducing the barrel of the syringe well into the left nasal passage, you resolutely, even calmly, but always quickly, press home the piston.”

“Is that all?” I inquired.

“Yes, quite,” he modestly replied, “save that if possible it is well to see that you can retire through the open door in time.”

“What did the patient *say* when she recovered from being taken silent?”

“She said, if I remember correctly,” replied he, “‘Oh, Gawd!’ I didn’t wait to hear any more.”

“Thank you, Doctor, for your nice little lecture. The

only trouble is that one must be the only practitioner in the town, in order to employ your technique."

"Perhaps you are right," he sighed and lapsed into a Danish silence—for which no empiric treatment has been discovered.

The afternoon was approaching, and we also had a repast which we called luncheon. Afterward nothing would do for these sailors but to mount some fifteen able-bodied horses and attempt to ride around and see the town. It was a noble cavalcade, but it left the natives very sceptical of our military connections.

St. Thomas does not vaunt its traditions, but it preserves them. The harbour, embraced on three sides by steep mountains, is an idealized pirate cove to this very day. Many a house of bygone days, with dazzling white or light buff masonry, crumbling tiled roof, high-walled garden, and winding stone stairway peeping out from leafy seclusion, still hoards a wealth of unpublished and unpublizable memories. The narrow, irregular streets, the cobwebbed shop windows, the mouldy, rummy smells, the picturesque lofts, treasury of supplies for ships that have forever vanished; above all, the turbaned old negresses with their rich mellow African-English brogue as thick as clabber, lull our practical Americanism of the 20th Century to sleep and bring us vivid waking dreams of times when the noses of a hundred ships hung over these wharves, when singing, sweating negro slaves disembowelled them under a tropical sun of their ill-gotten plunder, when bands of swaggering whites, be-whiskered, be-sombreroed, with boots and clanking spurs, lace collars, flowing locks, and jangling sabres, roared unutterable songs through these streets, beat in the deal doors of these sedate old creole mansions, and made pirate love to the trembling women

folk of their vassal pirate merchants, or sprang capriciously to arms in fraternal strife.

There are at least three distinct monuments of these rakehelly, rollicking days. The rest must be conjured up from the suggestive general effect. At the time of our visit the *Vigilant*, legitimate slave-ship of over a hundred years ago, still cast anchor in the harbour of Charlotte Amalie. In spite of her hoary age, this ancient beldam, crooning out her infamous history from her withering spars, still slipped around and about her island haunts like a decrepit old hag. No longer able to roam at will, but utterly unable to bury her past, she crept from port to port with fragments of insular news, with bits of gossip of the world grown small since the greatest of infirmities laid its chilling hand upon her.

And overlooking the harbour are the so-called castles of two of the most swashbuckling rogues of all the Brotherhood. Black Beard's Castle, however, is merely a forbidding tower: Edward Teach's home was the sea, the tower merely an incident in his life. But Blue Beard's Castle is another matter. In its tropical setting this stronghold is a poem of buccaneer days. Perched on a high and rugged hill, it commands not only the town, into which one can drop a pebble from it, but also the turquoise bay and the wide blue Caribbean Sea beyond.

On the abrupt edge of the flat top of this hill lies a fringe of bristling cannon. Their make and their appearance, pitted though they are by the rust of centuries, proclaim the undeniable facts that this was not Blue Beard's summer residence but "where he lived," and that these bronzed guns, some Danish, some English, others French, or Dutch, and still more Spanish, were each of them trophies of Blue Beard's audacious valour. What stories their foul old ugly mouths could tell of the Spanish Main! But

from roaring themselves hoarse they have at last lost their voices and preserve only their brave defiant air, mellowed by an age which permits them the caresses of clinging vines.

The final touch to the infinite pathos of an almost forgotten island, once the home and rendezvous of all the wild spirits of the early Americas, once so rich as not to know the value of things which from sheer satiety were destroyed, was found in a tight little cove on its coast an hour's ride by horseback from Charlotte Amalie. In this cove lay a fleet, the saddest fleet on which our eyes had ever rested. Here was a huge vessel without a superstructure, there a noble four-master, recalling the glories of the departed American Merchant Marine, still further away the submerged hull but complete upper decking of some old tramp. Nothing of life was seen. The fleet was motionless; it did not even move with the dancing water. No blast was heard from the eternally silent stacks; the snapping and groaning of blocks and tackle were forever silenced. It was the silence of the tomb, broken only by the scream of the wild heron and the swish of the graceful palms. The bay was a wrecker's bay. Hither came worn-out merchantmen for their last anchorage.

On the shores of this violet bay, deep in the green grove, lay a hidden shrine. The wrecker himself was a remarkable man. He stripped these vessels he had bought as junk, and thus he lived. But he was not what in every other place on earth, save the West Indies, he would have been. He was a charming and cultured old gentleman, master of several languages, friend of all the well-known poets and historians, a philosopher and nature-lover. He had built for himself a house like no other house out of the selected bits of a hundred ships. It was long, rambling, hidden away in the palm grove. His study was a mahogany pilot-house, his multiple rooms were loaded with price-

less bits of marine carving and decorated with the relics of every port from the China Sea to Patagonia.

During our visit he showed us every nook and cranny of this odd, ramshackle building, peopling our imagination the while with unfamiliar scenes of many a far-off land and the lore of the seas of 1730. As we stepped out of his front door to say good-by, a wistful look came into his eyes as he pressed us to visit his cemetery.

I confess that I had no desire to see more dead things. I was depressed enough by those poor, mute, rotting shells in the bay, without looking over the cemetery of his fore-bears. But something told me to accept. We walked slowly toward a group of stately palms. His eyes snapped, and a wave of colour mounted to his pale cheek. There, bolted to each tree trunk, was the figure-head of some ship.

“Here,” said he, slapping the bare arm and ample bust of a female figure, “here is *Cleopatra!* There is *John Smith* of Rockland, Maine; the one with the clay pipe over there, near *Cleopatra*, is *Julius Cæsar*. There is *Napoleon*. Here is *Rutherford B. Hayes*—President Hayes, you know, and the first Prohibitionist. Near him there is *Captain Kidd*—” and so on through a long and impressive company, of whom the uncanny, staring eyes and anatomically marvelous figures, which still showed traces of gaudy paint, gave less than a hint.

We left against our will; and as the sun threw its last golden shafts into the tousled locks of green that ceaselessly waved in the breeze, there stood out against a flaming sky the lonely figure of the last buccaneer of the Spanish Main.

PART FOUR

THE BUCCANEERS OF LANGRES: 1917-1918



Chapter XIII

I

“**B**UT, General, who ever heard of sending into active service four field hospitals and four field ambulance companies, nearly a thousand men, without anything to do anything with! Suppose I should suggest that you leave all of your ammunition and arms ashore—that they would follow you in another boat? How would you feel about that?”

“But I tell you your Medical Department should have thought all this out before.”

“How do you know they didn’t think all this out before, and that somebody didn’t step in and scrap all of their plans? Now, I tell you there’s only one way to do this; and we can’t afford to let anybody know what has happened—not even our own men—for we would be the laughing-stock of the Allied Armies. Give me special permission to go ashore with Colonel Porter [my Lieutenant Colonel, second in command], and I will engage to get the equipment that we need before we sail, if it’s gettable.”

“You’re clean crazy. However, I’ll give you the permission. But please remember that if you don’t get back by four a.m. to-morrow, we are going to pull out without you.”

This conversation took place early in the afternoon of June 13, 1917, between myself and General Sibert, Commanding the First Division of the United States Army,

with orders to sail for France immediately, prepared to take the field. We were in the middle of the Hudson on the flagship *Tenadores* of the United Fruit Company. All the other vessels of our convoy were lying at anchor with us, every man aboard, and waiting for the signal to carry the Flag for the first time to Europe.

I say the First Division, but I should say the First Division minus its Field Artillery, and minus, among other things, the entire equipment of the Medical Department for field operations. Save for regimental equipment and the limited supply of the ambulance companies, we hadn't a hospital tent, a single box of dressings; and, if a battle had taken place, we could not even have carried the wounded off the field for lack of stretchers.

I had had a brief but illuminating talk with my officers before bringing this matter to General Sibert's attention. I could not be blamed, because I myself had only received the order to go that very morning. A tidy orderly had presented himself at the annual meeting of the American Society of Tropical Medicine, just as I was beginning my Presidential address, with the crisp words: "Sir, General Sibert's compliments, and you are to report immediately to the flagship *Tenadores*."

And I had turned over my manuscript to the Secretary, asked him to read the address for me, bade good-by to my colleagues, and left, all in the space of three minutes. My baggage was checked at the station, and, as there wasn't much, I took it with me in a cab.

My connection with this first expedition came about in a rather curious way. My chief, General Gorgas, was in Puerto Rico in May, 1917, as President of a board to determine whether some cases of unusually severe dengue fever might not be yellow fever. I had just been able to show General Gorgas and his confrères an animal which I

had killed by feeding the *Monilia* I had found in sprue, and they had been duly impressed. But when I mentioned a little later that, having done my bit here, I wanted an order carrying me to France with the Army, my General got quite excited.

"What?" he said, half laughing. "Do you think that I am going to send a high-class laboratory man, on whom we have spent a lot of money by leaving him in Porto Rico so many years, to get butchered up in France? No, sir, you will *not* go to France! Besides, you're no longer a military man. You have forgotten all about military affairs."

Our chiefs hardly ever realize the effect of what they say on their subaltern officers, and my dear old General had said just what he should not have said. From that moment I resolved that I *was* going to France, and I took a savage delight in making him the unconscious cause. I would show him over there whether I was still a military man or not!

Without saying a word to anyone of my real intentions—not even to my family—I asked for a leave-of-absence of a month to go to New York and preside at the meeting of the American Society of Tropical Medicine, of which I was President that year. True, my wife asked me why I was taking certain field equipment with me when I came to pack my trunk; but I managed to give a discreet answer to all leading questions, kissed her and my children an unusually warm farewell, and sailed for the North, making a bee-line for Washington where I had pretty good friends.

The acting Surgeon-General, in response to my earnest request to be sent with the First Division, immediately granted it, stating that the order would come out promptly, and I left just in time to preside at the opening meeting

of the American Society of Tropical Medicine. It was at this meeting that I was interrupted by General Sibert's orders.

While these thoughts were running through my brain, Colonel Porter and I were speeding towards shore at 86th Street, in a little yacht loaned to the Navy by a patriotic millionaire. At a time like this, one instinctively looks to a man of action, no matter what his rank. I had a friend who was spoiling to be in the fight, but who had been condemned to remain in New York as Medical Supply Officer. I was sure I could depend upon him, because I had never known that man not to be prepared for every emergency which he was supposed to meet. He was Major Hartsock of our Medical Corps. Once ashore, we scrambled into a subway and made for a very unprepossessing-looking warehouse down near the Battery. There, at two p.m., in a stuffy little office, sat my friend Hartsock, looking vacantly into his air castles.

When I entered with Colonel Porter, he jumped up and cried: "Well, I'm damned! What are you doing up here?"

"I'm sailing for France with the First Division to-morrow morning at four a.m., and before that time I've got to have the complete equipment for my field hospitals loaded aboard our convoy. No equipment has been furnished us; how many field hospitals have you in store?"

"Ten," he replied laconically.

"I'll take all I need now," I ventured.

"I'll hire all the trucks I can get hold of in lower New York and a tug by 'phone, if you will see to getting this stuff aboard the transports," was Hartsock's answer.

Kindly note that Hartsock did not lament that I was gutting his supply depot. Above all, it did not enter his head that that tentage and equipment would not be placed aboard those ships before we sailed. . . .

Colonel Porter and I watched the loading crane take the last hempen basket of this tentage and equipment over the side of the last transport about half-past three in the morning, and then we scurried away in our tug to clamber aboard the *Tenadores* just as the ship was weighing anchor. Tired and happy, we sat on the deck and watched the blinking lights of New York, wondering if this was to be the last blink we would ever see of them.

Surely there was nothing very encouraging in the haggard face of the good old quartermaster in charge of Army supplies in New York, who, with a tear in his eye, bade us good-by in a husky voice just before leaving us in his little tug. "You'll never get over alive," he said to General Sibert. "Every one of you damn fools will be torpedoed before you ever get over. The Navy's crazy, and they're making us crazy by talking to 'em."

His speech, the hour, this weird secret departure oppressed us. If we were doomed to the fate he so surely predicted, it seemed a bit hard to go without the pressure of a single hand, the sound of one encouraging word. . . .

But the great city with its scattered night lights was not asleep. As we silently crept in single file down the majestic river and out into the unknown, suddenly from every quarter ashore cannon crackers roared out and rockets shot up, while the bells rang from every church steeple. New York, the worldly city, for once showed a heart; and, though forbidden to see us off and obeying orders, thus from its heart it bade us Godspeed in the dead of night that 14th of June, 1917.

And now Colonel Porter and I had our first opportunity to view the quarters that had been provided for us on the *Tenadores*. This freight steamer carried passengers, and its accommodations were nothing if not luxurious. Ours was known as the bridal suite. Besides a large room for

sleeping, there was an anteroom for visitors, finished in delicate French grays and mauves with floral garlands artistically adorning the frieze, a heavy Oriental rug, and an elaborate set of mahogany furniture, including a writing-desk. Porter took a great dislike to this room, which he said was not fit for soldiers and tended to sap their courage by too much frills and foolishness. In proof of his lack of harmony with his surroundings, he proceeded to use the washstand as a writing-desk, by propping on it a hideous unpainted pine-wood field desk of his own. The writing-desk proper he used as a stand for odds and ends of equipment such as boots and spurs. I remonstrated, for I wanted to pass my last days on earth like a gentleman, but Porter—he was a serious man—argued that since this was war, all this folderol was out of place.

The officers spent their evenings in the Social Hall—without lights, of course. The chief amusement of those who congregated there after dinner was to tell harrowing stories of sudden death at sea from torpedoes, and then observe the happy effect upon the rest. One night about eleven, however, I was standing in the doorway talking to a quartermaster friend of mine. It was a rough night, dark but for the stars. He suddenly broke into my conversation with a “Look!”—and I followed his finger. Our group of transports, with their flanking destroyers and the Navy cruiser leading the way, had just set their helms to port after the toot of the whistle on the cruiser—the preconcerted signal to zigzag—when I saw several streaks of phosphorescent light rapidly approaching under the black water. Before we could take another breath, the rays had passed about fifty feet ahead of our prow. Instantly the guns from the cruiser and transports roared out, the lights flashed on, and the convoy scattered in four directions. It was thought that the German torpedo fleet, lying in wait

to the north of the Azores, had taken our zigzag signal to mean that they had been discovered; and hence they had fired too soon.

2

As we landed at St. Nazaire—General Sibert first, and we of the Staff after him—the troops swung their bodies more than half over the rail, curiously eyeing the people and passing God alone knows what comments upon this dispirited port, of which most of them had never even heard.

Here and there were groups of French, looking pretty dumpy and down in the mouth. Before long the various elements of the French Army began to filter in. I had expected a colossal burst of enthusiasm with lots of speeches, a good deal to eat, and a lot more to drink; but there was no formal reception. On the contrary, the whole temper of the day was summed up by a French officer, who said to General Sibert on the dock:

“Well, it’s pretty near over now. But we are at least glad to have our friends around us at the end.”

There was no doubt in our minds whose end was meant.

We were taken immediately to our camp on the outskirts of the town—long pine barrack buildings, exceedingly practical, very comfortable, but frightfully plain. The Headquarters officers—some fifty of them—all slept with the General in one barracks, and the first two or three nights were spent in repressive measures against snoring. There were graver concerns to worry us, however, and one bugaboo was drunkenness. For Prohibition, like many another experiment noble in intention, was first tried by Executive Order upon the Army, that handiest of dogs. In our fertile imaginations, we feared that now we were going to pay for all our unnatural straining after righteousness,

here in this land where wine and Hennessey's Three Star were the very staff of life. But the Army, as usual, was quite reasonable. In reality, it was good discipline that prevailed, and not any fixed idea of the wickedness of liquor.

It was not long before arrangements had been made to canton us with the French Alpine Chasseurs at Gondrecourt, a little town near the Front in the Haute-Marne. While the troops were getting cantoned under their officers, General Sibert decided to take his Staff, personal and administrative, in automobiles by way of the Loire valley to their destination. When we reached Fontainebleau, we decided to make a detour and spend the great national holiday, July 14, in Paris. Between the American Ambassador and the French Secretary of War, a monstrous celebration had been arranged at the Trocadero Palace, and thither we went.

This was no longer the dock at St. Nazaire. It had taken two weeks for the French to wake up to what the return of Lafayette's visit by the American Army meant in their hour of gloom. On that afternoon, France asked her most talented actors and singers to represent her, and our American officers had seats of honor, especially General Pershing, who was deliriously cheered by a standing audience.

We now took up our way again toward Gondrecourt, where we were destined to spend six months of training. After the lovely Loire valley, this town was distinctly a shock. No architect of the Renaissance had ever visited Gondrecourt—we were sure of that. A house in Gondrecourt consisted of four walls and a roof, with some apertures for people and others for light. I was billeted with two officers in the second story of one of these rhombic structures of mournful gray stone. It overlooked a small square, which was notable for a scantily clothed cherub in

the center of an icy-cold fountain, and for a tavern where loud differences of opinion were settled. Gondrecourt's specialties were mud and manure piles. Its description may be summed up by stating that it was a town of gray stone traversed by rivers of mud. The *boue sacré*, or *sacré boue* (as you wish!), of Gondrecourt was a byword in the A.E.F. As to manure piles, most residences had them—in front, on the street. They served a useful purpose in warming Gondrecourt, and were the only method utilized for heating the town when cold weather came. I fail to recollect the number of heat units developed from the fermentation of manure, but it must be inconsiderable.

When one speaks of Gondrecourt from the standpoint of the First Division, one really means a group embracing some ten towns exactly like it over the area fifteen miles square assigned to us for billeting and training. The mere mention of its name to a First Division man, no matter where you find him, provokes to this day no other comment than a groan.

And it was my unhappy Department that had Gondrecourt and its frowsy little daughter-towns to clean up. In fact, a portion of every day was dedicated by me to scrambling up and down flimsy ladders into lofts of barns to investigate the personal hygiene of the American soldiers who were thickly stowed away therein, as well as to nosing around the manifold outbuildings raised in the name of the Goddess of Health for the comfort of these men. The nature-worship of the American Indian has left some traces at least: the American soldier has inherited the aborigines' unwillingness to visit a formal temple for the worship of Nature. But the less said about how I covered this fifteen-square-mile area daily, the better.

As I have said, in some of the towns were billeted battalions of the Alpine Chasseurs—the famous "Blue Devils"

—acting as our tutors. And their Division Surgeon, a mighty Gaul with a black pointed beard and the manners of King Francis I, shared with me my Division Surgeon's office. Colonel Cultin was a veritable godsend, as far as I was concerned, for he had been at the Front since 1914, and had accomplished the miracle of becoming a decent father to seven hundred Divisional Medical Department soldiers, every one of whom he knew as few fathers know their sons.

At the very outset, knowing that we had no experience in our duties in modern warfare, he devoted a whole week to digging sections of trenches and dugout battalion aid stations. On the last day he staged a sham battle over some miles of undulating forest and field, and conducted sham wounded from the line through aid stations to the ambulance head and thence to his field hospitals. This sham battle was embellished not only by feigned wounded, but also by dead; and so great was the enthusiasm on the part of his personnel that only the bugle call to quit saved these "dead" and "wounded" from being buried or operated upon for what their first-aid tags said they had. It took a week, as we have seen, for Colonel Cultin to stage this show. It took us another week to get the mud off of us, and to recover our breath from the foot-race we ran in order to see the position of each outfit spread over miles of hill and dale.

Now I had only needed this to bring my curiosity to see the "real thing" to a boiling-point. So I requested permission of the General to visit the French Front at Pont-à-Mousson, where General Goubeau was holding the right of the line on the road to Metz with the 153rd French Division. Thus I suppose that I must have been the first Medical Officer in our Expeditionary Force to get into the line.

General Goubeau was stowed away with his Staff in the

bowels of the earth. This was the queerest military situation that I saw during the War. The picturesque old town, traversed by the Moselle River and nestled among the Vosges, was only 1,500 yards from the German line whose position completely dominated it. Although thus in easy range for certain and rapid destruction, it had hardly been touched. There certainly must have been some tacit understanding between the French and the German Armies not to precipitate the destruction of this little gem, which lay midway between Metz and Nancy.

Only about a tenth of the 15,000 inhabitants had remained, and they went about with complete unconcern, not even carrying gas masks. The stores were open, the markets were busy, fields were being cultivated, and no excitement was evident, although double red crosses indicated the position of safety caves in case of bombardment. Of course every now and then the Germans would let a shell drop out of politeness, so as not to permit the French to think that they utterly despised them as enemies. This would demolish a house or so and maybe kill a few, and then things would quiet down for a week.

The public square where the Hôtel de Ville was situated presented an unusual sight. Here all buildings opening on the square, the size of a city block, had arcades over the pavement, with bazaars, provision stores, and storehouses. The square itself was entirely deserted, but not the arcades, which were well patronized by the civilian population and the soldiers. These arcades had been converted into tunnels by piling bags of earth between the pillars to prevent little accidents to passers-by from the "spatterings," should a shell burst in the centre of the plaza. But the French had not neglected to plant flowers along the top of this artificial wall.

To get into Pont-à-Mousson, one had to cross a bridge

over the Moselle. Here at least were sentinels and evidences of recent shelling. We alighted from our automobiles and entered the last house at the crossing. Someone must have stood at the window there and stuck out his tongue at the Boches, because a shell had fallen on it just a few days before. But the stairway remained, and we climbed to the third story whence we had an excellent view of the entire line of German trenches, which lay well within accurate rifle fire. It should be explained, that while all of the roads approaching this town were camouflaged by huge woven mats of reeds, every soul who crossed that bridge was in plain view of the enemy and exposed to their rifle practice.

But if the town itself was relatively immune, the French positions on the flanks and behind it certainly were not. Near Pont-à-Mousson a field hospital had been wedged in between a brewery and an iron foundry. Needless to say, guided by the glare from the iron furnaces, the enemy aviators would pay a visit to this cozy corner and drop a bomb or two on it whenever they had nothing else to do. They took a generous slice from the field hospital at each visit. But the brewery had floors of cement reënforced by steel girders, and anything dropped there merely penetrated the upper two of the six stories. Hence the basement was as safe as though it were in the depths of the earth, and thither they had moved the left-overs of the hospital. Thus it was that we first saw evidence of—and possibly the reason for—the well-known affinity, found all along the Front from Flanders to Alsace, between medical organizations and breweries.

But now and then, even at the threshold of war, there came times when our systematic life left us an hour or so for quiet reflection or an outing. On the few occasions when I took advantage of such rest periods, it was to wan-

der ten miles over the hills to a little stone house of the Middle Ages. It may appear fantastic that during the hurly-burly of a practical American divisional training-camp there should be time and inclination to dream of the heroic past. But Domrémy seemed just as the Maid had left it; and there one unconsciously found one's self living the life of medieval France. Nothing had changed. War had not even disturbed the vines that clung to the old house filled with relics of Jeanne d'Arc.

During one of my pilgrimages to that little shrine, a division of French Infantry happened to pass along the road leading through Domrémy. As I lay under the trees, I heard the bugles sound the "*Attention*," and could literally *feel* the rhythmic tread of thousands of men filing past to the strains of "*Quand Madelon*." It was a lonely experience, never to be forgotten. . . .

And there, with only the birds and the rustling water to keep me company, I thought out many a plan for the redemption by science of our fighting men; for the application of new ideas in the practice of medicine and surgery toward the salvaging of the soldier—the one measure, after all, that was destined to win the war.

3

As October came on, it got pretty cold at Gondrecourt, but no amount of cajolery could induce the French to give us any firewood from their precious forests. There was no stove in our house, and when winter came we had to shiver until the kind-hearted quartermaster loaned us some oil-stoves. These were intended for heating coffee, but, when placed beneath the chair, they warmed the human icicle seated above them and draped with a blanket that fell on all sides to the floor.

We had reached the town in summer, and so the Divisional Field Hospital had been located on the airy top of a hill. But now that autumn was upon us, our sick began to suffer from the cold, and I selected a new site sheltered by trees near Division Headquarters. Unfortunately, the Y.M.C.A. had established itself there. That humane organization not only objected to having its space contracted and to losing its tennis courts, which none but Y.M.C.A. employees had time to use, but it also argued that the proximity of so depressing a neighbour as a hospital would nullify its efforts toward the spiritual uplift of our healthy troops. Consequently, our poor men had to shiver until battle warmed them up. And the Y.M.C.A. kept on playing tennis.

Memories of Gondrecourt are crowded into some drawer of my brain, having been crammed in so rapidly that it is only by rummaging about that I bring them to light. But they are all there, I think, from the firelight talks at the smoky chimney-piece of the old dragoon of 1870 in whose house I was quartered, with his reminiscences of the army of the Emperor Napoleon III and the disaster at Sedan, down to the old French woman who lodged a complaint with me—and a plea for damages—based on the charge that the men billeted in her barn talked so late at night that they kept her sheep awake. But there is no room for all of these incidents.

My director of Ambulance Companies, Louis Brechemin, liked the "rough stuff" and the mule-drawn ambulance, and he furnished many a choice page from the days of General Custer for the trench-worn Gallic soldiers to gaze upon. This was all the cavalry the First Division possessed, and I firmly believe it had a lot to do with keeping us American. It is true that half of his personnel was employed in nothing else than leading horses and mules sev-

eral kilometers away to drink and bringing them back, currying them, and cleaning their harness; but his ambulance companies made a stunning name for themselves on the battlefields of the old First.

The germ of the School idea sprouted at Gondrecourt. Here our Medical Department had a full-fledged divisional training unit, under my personal charge and with my participation, from the time we settled down. It was not long before the Corps School came into being. One of its first lectures was delivered by me to some five hundred officers of the line on that curious and disabling affection seemingly inseparable from muddy trenches, and denominated "trench foot." These young heroes were somewhat supercilious at having to sit and listen to a "medico" lecture them on such a silly thing as sore feet, when they were thirsting for the blood of the Boches and had their heads full of heroic deeds of arms. It was with exquisite delight that I heard that the School had to be closed within a month of my talk, because four hundred of these same well-uniformed heroes had to be put on sick report for trench foot contracted at the muddy school of Gondrecourt itself! They learned to rub their feet with whale oil and dry their boots, after that; and I was only sorry that I couldn't drive home the lesson with a practice march or two.

By this time the nucleus of the Army of the United States in France had finally gotten it into its head that it didn't know everything about this war after all, and the school idea all at once swept the Army like the itch. General McAndrews, who had just been appointed Commandant of the Army War College, picked up a bunch of us and carried us off to Langres to start the thing.

This was a bitter pill for me. It had never occurred to me till now that too much rank has its privations. Here

I had been commissioned a full Colonel and was no longer eligible to remain in the First Division as its Medical Chief, purely a Lieutenant Colonel's job. My mantle fell for the time being on fat old Porter, the truest, bravest friend I had, and he kept me in close touch with the First.

But before I bade farewell to the old Division, I was to be treated to one of the most inspiring experiences that I had in France. The day before the First Division left Gondrecourt definitely to take their place on the line, a huge review of both the First Division and the Alpine Chasseurs was staged. The review was attended by the President of France and the Generalissimo of the French Armies, General Pétain. It was held on a great plain some two miles long and a mile wide. And it was a tremendously solemn occasion. A speech was made by President Poincaré to the officers after the troops had passed in review.

As battalion after battalion in close rank swung by, healthy and strong, with such marching exactness as I had never seen in my life before, I wondered how many of those men, to-day so fit and well, would go back cripples, and how many would never go back at all.

There was not a civilian in sight, and the affair was enlivened by the sudden attack of a German air squadron which did its best to get past our air guard and at us, but whose presence made not the slightest impression on those marching men whose lines were unswerving and perfectly straight. The combination of steel helmets, glinting bayonets, and wave after wave of well-uniformed soldiers in this sea of green bordered by dark and mysterious forests made a deep impression on us all.

It is said that, of that 28,000 of the First Division who originally landed, only 1,500 reached their native home again without wounds; and nearly 8,000 still lie in French

soil, to remind the French people that America's First Division alone paid well in red blood the debt of 1776.

4

At last no one could be found any longer to make funny remarks, to belittle the conception of a school for war for the American Army while the War was actually going on. But why on earth they should have considered it a school and, above all, *named* it a school and its headquarters an Army War College, is past my understanding even to this day. In reality it was a centre at the Front for the battle-training of all the higher officers, and later it took in sub-altern officers as well, captains and suchlike.

Fortunately, I had conceived my plan in the solitude of Domrémy. When General McAndrews came to me and told me he needed me to head the school for the Medical Officers, which was ignominiously named the Army Sanitary School (more of an epithet than a name, I thought), I told him that I would like to serve with him above all men, but that I hoped that he would allow me to carry out my plan. He promptly promised to do so.

Now this plan, briefly, was that I should receive every month or six weeks one hundred picked officers from incoming divisions of the A.E.F., give them a preliminary set of talks on their duties in the theatre of operations in trench and open warfare for one quarter of the time, and then actually take them to the Front and put them into action with, or allow them to observe, troops engaged in battle. As we had at that time only a few divisions on the line, it was thought best to brigade them with the British first and later with the French, by which time our own troops would be available so that we would not have to burden our Allies with this additional responsibility.

The result was a series of ten sessions planned to acquaint almost a thousand Medical Officers, by actual demonstration and participation, with every phase of war from front to rear. It was fortunate that my stipulations were accepted, for in this way the officers of our Department were the only ones who really got to the Front and saw the War at close range before actually taking up their duties with their own units.

Our headquarters was Langres, about an hour below Army Headquarters at Chaumont and well within the theatre of operations. Langres is one of the picturesque old Roman towns of France, a walled city perched on a rocky hill, abrupt and precipitous on three sides. It is reached by a cog-and-ratchet railway and by a steep winding road cut in shelves up the ascent of the cliffs. Its quaint old gable-roofed stone houses are medieval, many of them castellated, and whisper of the days of the Duc de Bourgogne. Streets are cobbled and narrow, serpentine and overhung, having been made for fighting. The broad ramparts, in perfect preservation, hang above the steep cliffs and look out over the tops of fine old trees to sweeping plains of rye and barley, impounded lakes, and the crested hills of the France once known to armored men.

Here in the *casernes* of the French Army—for this was an army post in time of peace—was established the War College of the American Army, and scattered through the town were its dependencies. The French had commandeered a large gray-stone girls' school, the half of which was used for the quartering of American Medical Officers. From here they went out, after a course of preliminary lectures, to receive their front-line battle training.

In introducing the subject of my experiences with the French and British in the War, it should be borne in mind that we went to them for information—information which

was still confidential and had not reached the public press—information, the outcome of hard and dangerous experience, without which we would have lost an untold number of American lives and some battles. Naturally, our hosts furnished the thrills—not ourselves. A decent regard for our safety was exercised, of course; yet our Allied mentors could not avoid a considerable amount of risk to themselves and us, as will be seen.

The Front was not a seething mass of excitement. In periods of inactivity it demanded the unremitting vigilance of silent men; in periods of activity action came quickly, but also from silent men. The guns drowned the human voice, and carefully selected cover generally hid the actors from view. Indeed, activity on the Front was momentary and brief, as a rule, and days might be spent without any notable change in the situation. Not even the Commander could see more than a tithe of his men; and I still remember the conversation I had with a very famous and genuinely heroic Division Commander, in which he told me of his feeling of smallness and inadequacy as he wandered among his men during the life and death struggle in the Argonne forest.

"Why," said he, "if a commander wants to lose touch completely with the situation, all he has to do is to get out amongst his men where they are fighting."

When a battle starts, the Commander is in sole charge. But as the action progresses, an ever-swelling command passes over to the Medical Officer. This command, numerically immense, is at times even more difficult than the line to handle—the command of the helpless wounded.

My particular war-mission carried me over the entire Western Front, from the North Sea to the Vosges. It is unusual, to say the least, for a man to have seen so much in the space of time allotted; and I can only be grateful

for the breadth of vision of my superiors, who placed me in a position where I could see more than the occasional whoop and hurrah of men clambering over front-line parapets.

A large part of each pilgrimage had to be made on foot, through miles and miles of trenches, over shell-torn muddy fields, and into countless miserably ventilated, dank and dripping holes disappearing deep into the ground like the burrows of timorous animals. There by candlelight, or no light at all, men ate and slept, plagued by rats, covered with lice, and tormented by the itch. And into those holes they dragged their wounded, there to do the delicate, vital, basic things that would prevent infection and death or a never-ending pension list for war cripples.

Chapter XIV

I

IT WAS a chilly night in November. I had stepped into the cheerful old-fashioned grog-room of the hardy male element of militarized Langres, and had sat down alone at a little table and ordered a *ponche Américaine*. This was undoubtedly the favourite drink of the times of d'Artagnan, and its chief constituent was Jamaica rum, rather strong, please, and plenty of sugar.

A short distance away sat a trim, unusually bright-faced Colonel of Engineers. He also had been drinking *ponche Américaine*, and I saw him looking at me. It was not long before I caught a few words which, under the enlightening influence of *ponche*, seemed derogatory to my Corps and my profession, whereupon I arose and went over to him and administered a soldierly rebuke. Mutual friends interfered, and after we had a few more *ponches Américaines* we concluded to like each other very much.

From that day and hour—the hour I can remember, but hesitate to record; the day, unluckily, I do not call to mind—began a lifelong friendship with Colonel Paul Bond. And then began, too, the equally long-lived and famous Company of Buccaneers, legitimate offspring of a ribald poem which, although of genuine worth, cannot be repeated here.

Bond and I immediately agreed henceforth to eat together at my half-castle, half-manor-house on the Rue de Tournelles, where I had discovered a funny little bright-

eyed French housewife, spouse of an old horse-dealer. The two elderly people had agreed to take care of this handsome mansion during the War; and Mme. Bailly knew how to cook *parfaitement* and to set a clean tablecloth with good silver. We ate in a small house, a dependency of the big one, on the second story above a busy corner, from which all the gossip of Langres floated up to our windows.

Bond and I picked the rank and file of the Buccaneers, and when our Order was complete we consisted of seven, four of us Medical Officers, one a Chief-of-Staff, the seventh another Engineer officer. As Bond put it, the Medical Officers had the superiority—in numbers.

The great meal of the day was dinner, and everyone sat down promptly at seven. But ours was a dinner-table from which we hardly ever rose before eleven at night. For the Buccaneers loved to chat, to gossip even; and our fame spread. It was rumoured about that we had stolen a two-hundred-pound bag of sugar, but of course we vigorously denied this imputation. It was observed by chance visitors, however, that the demi-tasse was always suspiciously sweet and that we did not deprive ourselves of desserts.

One of our visitors one night was a certain ex-Secretary of War, here a Lieutenant Colonel of Artillery, and he was placed at my right. I knew him, for he was the Secretary of War who had thirsted for my blood when I refused to serve as the first Commissioner of Health for Puerto Rico, back in 1911. But he knew me not, for all of his firing at me had been long-distance from Washington. The Buccaneers could be extremely ingratiating when they wanted to be, and that evening I laid myself out. He was charmed. I could see that he was, until I lit a cigarette and made the following remark:

“It’s a queer thing how chance will reverse a man’s posi-

tion. Once you were my superior and tried to have me sent to Alaska to get rid of me, and, if you could have done so, you would have bitten a piece out of the calf of my leg; and now I am your superior officer and could order you about just as I pleased if you even dared to look at me hard, as you are nothing but a trashy Lieutenant Colonel."

He laughed and said: "What might your name be—I didn't get it."

I said: "You didn't get it, because everybody here was told not to give it to you. My name is Ashford."

His face was a study. But after a long silence, he held out his hand. "I am glad to know you," said he. "Here's one more man that I had misjudged, and, I hope, one more friend that I have."

But the Buccaneers' mess was not my only source of peaceable enjoyment. The suite of rooms which I occupied had been the home of a certain Dr. Michelot, an old-fashioned practitioner, well-beloved by the people of Langres. The old gentleman was also a musician. In rummaging around one day, I ran across his violin, which was a good one. It was not long before Mme. Baily ran up to the mess in a great fright to say that she distinctly heard Dr. Michelot's ghost playing his violin in my room. I invited her up to hear the ghost play, and was rewarded by a gramophone with a somewhat limited repertoire, which I used to accompany.

The next day, for everything in Langres was promptly known to everybody, the canon of the cathedral—Langres had a magnificent cathedral—paid me a visit, and asked me to come across the street to his quarters and accompany him for an hour before dinner. It was not long before this became another source of spiritual enjoyment, for the canon was a fine organist, and we even played at dusk in

the empty cathedral itself—an experience which only a violinist can fully appreciate.

2

But I have almost forgotten that a war was going on. My first session of the School, after a brief preliminary course of lectures at Langres, was a visit beginning December 3, 1917, to a similar training unit of the British at Bethune, which was only four kilometres from the line, and was one of the most hotly contested portions of the English holding-positions. This was near the headquarters of the First British Army, to which we were accredited, and we were quartered in a nunnery on the eastern border of the town. There we were by no means exempt from shell-fire. In fact, the British, always exceedingly polite, remarked when they assigned me my room: "See, we have given you the post of honour—on the corner of the top story facing the enemy."

Major General H. M. Thompson was Surgeon-General of the First Army, an unusually fine-looking gentleman of over sixty, and over six feet in stature, with white hair and friendly blue eyes. He was as enthusiastic as a boy and the very idol of his men, particularly of the "other ranks," as the British referred to their soldiers at the Front, where he was generally to be found. As head of all things medical in his Army, he naturally was the head of the School, but for administrative purposes the School had its own chief who was accredited with this duty officially.

The Royal Army Medical School at Bethune had arranged a terrific programme for us in which every minute of the day was accounted for, with hours for rising, for meals, and even for diversion. We usually left at dawn in ambulances bound for the Front; and there was noth-

ing that we did not see in this notorious sector, which embraced the famous La Bassée, Givenchy, and the tattered Vermelles.

On our first day we had not been running long before we were made to alight at what looked like a neat little camping community of some resort, with trees, well-laid-out walks, and trim huts to accommodate perhaps thirty or forty persons each. Off to one side were cobbler, tailor, and saddler shops, and other outbuildings. To another side the ambulances were housed. Only emergency service was provided for here, but there was a good operating plant, with radiologic outfit, preliminary heating room, and so forth. This was the Main Dressing Station four miles from the line, and corresponded to our Field Hospital. The point was that it did not pretend to be one whit more than it was—a place for the slightly wounded, and for exceedingly serious cases of emergency surgery which could not be moved further and had to be treated right here or nowhere. All the seriously sick and wounded were taken directly through to the Casualty Clearing Station which we were to see later.

From here we passed into an ever more dreary section, stripped of trees and houses, and came to a halt at a most mournful stopping-place. About all I saw at first glance was the bleached skull of a steer stuck on the end of a pole. But installed in the cellar of this demolished brewery (for such it was), and exposed to a delicious artillery fire, was the Advance Dressing Station—the nearest to the Front that an ambulance could go—which drained the Regimental Aid Posts at the Front itself. Here we entered the communicating trench, proceeding toward what the British Tommy had picturesquely named “Windy Corner,” near La Bassée, “where not yer ‘at but yer bloomin’ ‘ead was liable ter be blown orf.”

At this place the whole country was under fire and certainly looked the part. We passed a battery of artillery thundering away and finally reached a Battalion Aid Post, or, as the British called it, Regimental Aid Post. This medical dugout was ten feet underground, but only "splinter-proof"; a direct hit would have finished it. I asked the lone Medical Officer how many his post accommodated, and he replied: "Only five. But we chivvy 'em out as fast as we can to the rear."

Their equipment consisted of a few things for rendering first aid—a heated stretcher on a trestle enveloped in blankets, an oxygen tank, two Thomas splints, and a wheel stretcher—and this equipment synthesizes practically every first-aid post in all the armies. The object here was to get the men back out of range and into a decent hospital before any serious surgical work was undertaken. All of these dugouts were protected against gas by a series of two curtains seven feet apart, which were dropped at the sound of the klaxon or gong in charge of the gas guard.

But in spite of darkness, overcrowding, poor ventilation, and many other things unendurable in times of peace, these men had managed to make a home out of a hole in the ground. In this sector which was constantly shelled by day and night and sprayed by machine guns every time a man poked his head out, good-nature prevailed. The humour of the English is very subtle. They had named this medical communicating trench "Harley Street," after the stylish and sedate residential thoroughfare of the doctors of London.

Here the whole flat countryside was tumbled up from incessant shelling. Some of our greenhorn officers, in whom this poking about the Front had developed a burning desire to see the "real thing," so expressed themselves to the stolid-faced English Lieutenant Colonel, our host.

As they made it pretty plain that what they wanted was to go out and sit on the very parapet of a front-line trench and gaze into the eyes of their enemies, this extremely polite but silent Briton offered to take a limited few on a "wee stroll." I couldn't bear to let them go alone, and so I made one of the few.

This escapade turned into a faithful travesty on d'Artagnan's exploit with his three friends during the siege of La Rochelle.

We struck out toward the lines, and as we stumbled along the scene became more and more desolate. The weather was cold and cloudy. To liven our spirits the first place we reached was a so-called "strong point," dubbed "Hart's Redoubt." It had been heavily shelled and gassed only a few hours before, and was a deserted and mournful sight. The Lieutenant Colonel here took an extra hitch on his breeches and, looking round, asked us if we'd like to go with him to an abandoned machine-gun nest in the stump of a church tower nearby to look at the enemy just beyond.

We left the trench; and after scrambling in and out of shell holes for a while, the Colonel suddenly stopped and remarked in a low voice: "Here we are."

I saw neither church nor tower, but by stooping low we got under a pile of brick and climbed upwards for a few feet. Through a slit in the wall we looked down directly into the German lines. From this point to our right extended a swale some thousand yards wide. It resembled a field which had been badly plowed by a giant. I found it hard to believe that this had once been a peaceful town with little children running out into the street. And then across this swale we picked our way, stopping every few minutes and crouching in the almost level trench to wait for the shower of "pip-squeaks"—trench mortar projec-

tiles—to let up for a moment or so. The observation balloon of the enemy, in plain view ahead of us, had undoubtedly signaled our presence.

The scene was desolation itself and was not made any more joyous by the uncanny shriek of the shells as they passed over our heads or burst off to the right, to the left, in front, behind, throwing huge masses of earth high into the air. Not a tree was left standing; not one brick upon another gave even a hint of former human occupancy. We finally reached our objective—an observation point jutting out from the line of outposts and overlooking the German position only thirty yards away.

We had come by day to the famous "Red Dragon Crater," never visited save at night. Here we found a few English soldiers. The Battalion Commander of this section, who accompanied us, entered a little cubby-hole of a splinter-proof dugout penetrating the rim of the crater, and told us to look quickly through an eyehole in another curtain shielding a slit overlooking the enemy. What we saw was an immense excavation caused by the explosion of a mine and, just across the street as it were, our friends the Germans.

Now at last our guide showed signs of intelligent remorse for having brought us into this predicament at the behest of some of my imbecile student officers. But it was too late. It was my turn now. I made them stay there and eat every crumb of the lunch they had in their pockets, before I would give them the sign to pull out for the rear.

When we had returned, our student officers could not complain: they had been sniped at for a couple of hours with trench mortars; they had been used as targets for riflemen, who nearly killed one of them; and they had crept for at least a kilometre, generally on their bellies, through tumbledown trenches bordering the British Front. There

was not a man of them who was not bursting with pride at having had the shivery delight of being really at the Front. But not only were their appetites whetted for heroic exhibition. They had learned, with risk to none but themselves, that in order to carry their humanities and their great profession out to the fighting men, they would be obliged to shed the non-essential furbelows of civil practice, and to carry into war only the precise equipment that would count.

We had done our day's work, and we were on our way home. We found a disconsolate little bunch of men at a Regimental Aid Post in the cellar of a ruined house. They had been gassed that morning at "Hart's Redoubt" and were waiting for night to enable them to be taken back to the Ambulance Head. On our arrival from Langres, Bethune had seemed a pretty well-chewed-up and unhappy town; but as we entered it that evening after what we had seen during the day, it had the air of a gay metropolis in the lap of luxury.

3

I have had very little opportunity in this brief description even to mention men with whom we were daily associated. One often learns more from conversation, and casual conversation at that, than from a lecture into which a great deal of information is crammed in a short while.

The humanities of a Medical Officer were beautifully reflected by a remark of Captain Parkinson: "It is an ill-conceived idea of a commanding officer that troops to be efficient should do arduous service and be deprived of all comforts and even some necessities. This is not the time nor the place to weed out the unfit. The wise commander will try to keep all his men—not merely a few

who rise above his silly selective processes. It is vicious to get men up before sunrise, give them their breakfast in the dark, and start them out in the cold morning mist, chilled, underfed, and usually with wet clothing, to do a hard day's work, terminating again in chill and wet."

Surgeon-General Cuthbert Wallace of St. George's Hospital, London, was the very prototype of an elegant English gentleman and a consummate surgeon. Contrary to the French idea, as we shall see later, he believed that only pure emergency surgery to save life should be done in advance of a Casualty Clearing Station, that is to say, the first large, well-equipped hospital in the rear of the line and out of range of the guns. "Don't think," he advised my student officers, "that you are going to be fancy operators. Your efforts should be toward making at least good scavengers out of yourselves."

It is astonishing to see what a large part the general appearance and manner of a man has to play in the success of his undertaking. For instance, one day we were visited at Bethune by a man who instantly attracted my attention, not only from his enormous stature, but on account of the decision and strength of his face and the humour which played at times around the corners of his mouth. This man was Major General C. H. Burtschaell, Chief of Medical Service of the Lines of Communication. On his shoulders rested the responsibility of disentangling the sick and wounded from the healthy troops, and of transporting them quickly and comfortably to hospitals or to their homes back in England.

He told me that from January 1, 1917, to the date of our talk, December 18, 1917, he had thus transported 1,452,182 men successfully. He said that he had a Medical Board decide, upon a man's recovery, what kind of service he was capable of rendering in the future. It seems that they

classified a man "A" if he were able to resume all of his duties at the Front; "B" when he could do only light garrison duty, such men being referred to as "P.B.'s"—permanent base men. But notwithstanding the apparent simplicity of the work of the Board, he gave an example of their difficulties in the case of a man sent home after appearing before them.

"This chap goes to England, and after he has worn out his welcome there and perhaps had a row with his wife, he reënlists, and the arm that wouldn't move more than ten degrees is now moving the full 180. Now he stays in the trenches until he is fed up, and then he goes and tells the Medical Officer that he's having more trouble with his arm and says: 'Just look at what those doctors did! They sent me back with an arm like this!' The Medical Officer doesn't have time to look it up and orders him back, and you have to transfer him all over the country forward and back between hospitals, until he gets round to the Board again and is sent again to England. Some have done this as many as three times. In the last case recorded, the man decided to die. He was in a raid, and a friend of his was shot and killed. So he exchanged identification tags with him. His friend was not married. He was."

General Burtschaell fully recognized the value of various specialties and kinds of specialists, but certain among them he evidently considered a good deal of luxury under war conditions. He remarked with a smile that it was very common for a man in perfect health, who had been told by a nose and throat specialist that his nose was crooked inside, to be successfully operated upon and induce twenty or thirty of his healthy friends to go through precisely the same thing because he got out of it without dying. He said that one of these specialists would put a whole bat-

talion out of business if you would turn him loose. "But," with a sigh, "they are nothing to the psychiatrists!"

Another personality to remain vividly in my memory is Colonel Ross, the matter-of-fact, plain-spoken Division Surgeon of the Canadian troops. He lived over again for me, one winter afternoon, one of the greatest dramas of the War: the appearance on this world stage of the horrible gas thenceforth to play such a tragic rôle.

Speaking of the events at Passchendaele, he said, substantially, that during the first gas attack made by the Germans at Ypres, there was a loss of 8,000 men in the time it takes to say it, and that for ten days following, one Field Ambulance (field hospital—capacity 400 patients) evacuated all of the sick and wounded for three divisions. Experience, he said, had taught him that no less than one thousand stretchers were needed for a division.

The Passchendaele terrain was exceedingly difficult. The mud was so deep that after a while neither men nor horses could go forward. Thus it was that the First Division, which had advanced quite far at one point, was stranded out beyond anyone's help; neither munitions nor other supplies could be sent to them, nor could the wounded be evacuated. Some colonial troops had given way on their left flank which left it exposed, and this was the cause of their many casualties.

In one sector it was necessary to evacuate the sick and wounded over a road six feet deep in mud. The wounded had been got away, however, up to the last day, by the almost super-human efforts of the stretcher-bearers. They had to bring them out over a heavily shelled country—so heavily shelled, in fact, that the numerous holes made it difficult to pick a path, and, as it was continuously raining, these holes were filled with water. At night it frequently happened that the exhausted stretcher-bearers, in

going over the narrow course between two shell-holes, would slip in on one side while the patient slid down the other—and all three would be drowned. For this reason, and on account of shelling, evacuation had to be done in the daytime. On one day they lost eighty per cent. of their stretcher-bearers.

There were 27,000 casualties to handle over distances of from one to three miles by daylight, in the deep mud, and under a pitiless fire.

The Division Commander decided to build a corduroy road at all costs to bridge this gap. It cost them 1,500 men to build it under fire.

“But,” concluded Colonel Ross simply, “we took the ridge, and we still hold the ridge.”

4

On December 15, 1917, we started out from Bethune in ambulances to visit the Casualty Clearing Stations and subsidiary hospitals of the rear. The Casualty Clearing Station, or C.C.S. as it was called, was the real centre of medical activities at the British Front. It was here that the vast majority of the operations of war were done, and it was here, as a rule, that the gassed found their definite place for treatment and recuperation. It is not my intention to give a minute description of every C.C.S. I saw. But it will be necessary for me to give some general idea of what this important medical centre meant in the World War.

Primarily, this was where the Medical Sciences were called upon to salvage men—men who used to be eliminated from the Army and sent home—salvage them and *put them back on the firing line*. At times it, with its Convalescent Camp, was the only reliable source of reënforcement! Sec-

ond, it was the nearest point to the line where men could be operated upon, under sanitary conditions necessary for success, in time to prevent infection. And third, it was the great distributing point from which streamed those casualties which required a long or special treatment in the rear at the so-called General, Base, and Specialized Hospitals.

A large Convalescent Camp took up those men who needed no further active treatment at the C.C.S., and prepared them to reenter the theatre of operations. This latter hospital, like the modern conception of the C.C.S. itself, was an outcome of this particular war. In the French and American lines the C.C.S. was denominated the Evacuation Hospital.

At the English Front the C.C.S. was all the way from three to six miles, sometimes even ten miles, to the rear, generally at the railhead, but always within easy reach of it. Its capacity was usually from 500 to 1,000 patients, distributed in barrack buildings of wood, holding comfortably about forty men each. Without exaggeration, for neatness, cleanliness, and even ornativeness, hospitals such as these would serve as pleasant substitutes for many of our dreary hospitals in large cities in times of peace. From spring beds to the most elaborate surgical equipment, nothing seemed to be missing to make the soldier comfortable.

The following short description of the experience of a man I saw brought in from the Front near Vermelles will serve to illustrate what was going on at a large C.C.S.

From the time he was picked up in no man's land, it had taken him six hours to reach his destination. He was covered with mud, had an enormous A T painted with iodine on one side of his forehead and a large M followed by the figure $\frac{1}{4}$ on the other side. This meant that he had

received either at the Ambulance Head or the Main Dressing Station an injection of anti-tetanic serum; and that at one of these stops, or on starting him off, more probably, from the Regimental Aid Post, he had received a quarter of a grain of morphia hypodermically. He had a compound fracture of the right thigh from a piece of shell; that is to say, the projectile had gone through and shattered the thigh bone.

He stated that the Medical Department soldiers had adjusted his Thomas splint at the Regimental Aid Post; that from that time on, because of the morphia he had received, he had come through rather easily; but that the pain he suffered in getting in from no man's land to the Aid Post was so frightful that it had knocked him out for the rest of the trip.

The Thomas splint was a rigid heavy wire skeleton cylinder, springing from a padded ring, which fitted in the groin and extended all the way to below the heel. By strips of adhesive plaster applied to the sides of the lower fragment of the broken leg and carried down to a little wooden stirrup below the heel, the lower fragment could be pulled away from the upper one by twisting a cord attached to this stirrup after the manner of a Spanish windlass; and thus the raw ends of the bone at the site of the injury were kept from rubbing at every movement of the body. When such rubbing occurs from a fracture of this sort, the pain is so frightful as always in times past to have been one of the chief causes of fatal shock.

Our wounded man said that no one had touched the wound except to wash it off, pick away the worst of the dirt, and put on a clean sterile pad with bandages. When he reached the Advance Dressing Station, and thereafter at every stop he made, he was placed on a heated stretcher supported on a trestle with two blankets under him, one

wide open and falling to the floor hermetically enclosing a lighted primus stove, the other one folded once to wrap him up, and still another for good measure. He said that when he got in from his long stretcher carry he thought he was going to die in a faint. The pain he had suffered before he got the splint had brought on the much-dreaded surgical shock, from which so many of our soldiers died. By the time they got him at the Advance Dressing Station, he was cold all over, and his pulse could hardly be felt.

This little conversation took place in the receiving ward for recumbent patients, and at the same time the clerk had taken down his name from his diagnosis tag, his battalion, and other data of a military nature for reference, the process being rigidly referred to in the British Army as "getting his particulars." There was an old Lieutenant Colonel of the Medical Corps in this room, going about from one man to another and keeping a keen eye on signs which might lead him to send them immediately either to the shock room or the operating table. When he came to our man, finding him cold and with a rapid pulse, he ordered him into the "hot room," where he was heated up some more. Thence he was carried on a wheeled stretcher through a covered corridor to the surgical unit, where he was taken to the dressing-room, his splint carefully removed, the wound cleaned up, and the fresh dressing applied. After this he was wheeled into the X-ray room, where the radiologist, fluoroscope in hand, marked with an indelible pencil in front and at the side of the thigh the position of the projectile.

On leaving the X-ray room, he was taken to the anesthetizing room, and when under ether was wheeled into the operating-room, just as the surgeon was finishing another case on one of his two tables. The technique of the operation done in this case was that of the primary suture.

But as this epoch-making advance in military surgery has revolutionized the whole surgery of war, I shall wait to describe it as performed by Lemaitre, its originator, with whom I was privileged to work later at Bouleuse.

The quarter for the gassed was quite different. Here no time was lost in separating those who had received some form of chlorine gas from those who had received mustard gas. Both were stripped of their clothes, which were thrown out of the house through a hopper. The chlorine gassed, who always entered a separate barrack building, were put into pyjamas and to bed. There they received oxygen-gas inhalations by fours from individual pipes—a treatment which had to be kept up continuously for forty-eight hours. This was an exacting process; for hopeless chlorine cases are conscious up to within five minutes of the end.

The mustard gassed were well washed with alkalies, and then kept under observation. With mustard gas the effects do not appear until from three to twelve hours after, and the only danger to life is the damage done to the lung. It causes stripping off of the mucous membrane of the bronchial tubes. It first affects the eyes, then nausea and vomiting come on, and finally the skin is affected. The pain is simply fearful, and men have to be strapped to their litters. At the end of the first day a little laryngitis comes on with a short dry cough, and up to four or five weeks later deaths keep on occurring from bronchopneumonia.

After having seen a number of such Casualty Clearing Stations, we proceeded on a long ride to the lower limits of the sector held by the First British Army, where we found the Canadians grouped around Arras. They had four immense Casualty Clearing Stations with accommodations for 10,000 wounded and gassed. They were located

on a muddy plain, and, although the terrain had been sewer-ed and provided with a water-supply, duckboards had to be used to get from ward to ward. Two C.C.S.'s were grouped near Arras, one built of Nissen huts, the other installed in tents, with a combined capacity of 2,000 pa-tients. This centre, grouped on a hill near a railway sta-tion and surrounded by ammunition dumps and repair shops, was a regular bomber's delight.

Now here enters the great question which agitated the Medical Services in all three Armies: should these big units be kept mobile or not? Everybody agreed that they should be kept mobile, but only the French and the Americans seemed even to try to keep them so. The C.C.S. of the British Army was generally fixed forevermore by an elab-orateness of construction and detail that would have done credit to the builders of Rome, and in this the Canadians led the Empire. In answer to a query from us as to why such huge and stable organizations were preferred, we were told that the chief function of a C.C.S. was to reduce the num-ber to be transported—to keep the men of the division at the Front—because, once a man gets beyond the C.C.S., he is lost to his division. This was exactly the reverse of the American Army's point of view. We tried to evacuate rapidly enough to prevent the immobilization of C.C.S. units, and thus permit them to be moved forward with the troops.

It was at one of these Stations that I saw, as I was des-tined to see so many times, the last five minutes of a too-often repeated tragedy: a death from chlorine gas. There, sitting on the bed, fighting for breath, his lips plum-coloured, his hue leaden, was a magnificent young Canadian past all hope in the asphyxia of chlorine. They were trying to get him to breathe through the mask, but

he was a powerful young man and had literally thrown down all of the Medical Department men who came anywhere near him.

I shall never forget the look in his eyes as he turned to me and gasped: "I can't die! Is it possible that nothing can be done for me . . . ?"

5

Our first visit to the British was about to end. It was the 23rd of December, a crisp, cold day, and I had gone to Lillers to fetch General Thompson for a banquet we were giving him in farewell. The refectory of the nunnery where we were quartered was on the first floor and looked right out on the corner of the street. A company of English soldiers, relieved from the line to spend Christmas in Bethune, had just come in and had halted on our corner while waiting for their quartermaster to arrange for billeting.

But, while they were gayly discussing the wonderful times they expected to have during the Christmas festival, a Taube plane which had followed them at a distance, unnoticed, all the way in from the trenches, now suddenly swooped down from the high heavens and let fall a bomb with such precision as to kill outright or dangerously wound eighty-five per cent of the men, tear away the whole front of our building, smash every bit of glass and crockery on the table, and turn our banquet hall into a shambles.

One more second and General Thompson and I would have been among the casualties: our machine was hurled against the side of the road just as we were driving up to the door.

We went supperless to bed at dawn, having spent the entire night doing the best we could for the poor wretches

who escaped death. But the baptism of blood served to sanctify the friendship that had sprung up between England and her far-away cousins. This blood was considerably thicker than any wine and water we might have served in a friendly banquet, and it united the two Medical Services in bonds that were never broken thereafter.

Chapter XV

I

THE first expedition to the Front was such a tremendous success that when we started out for our second, on January 10, 1918, we went with the foreknowledge that we were going to have an interesting and exciting time. There were only nineteen in this group, but they were all majors, save for one lieutenant colonel and myself. In order to get to the French battle-training center for Medical Officers, which was at Bouleuse, an afternoon's ride up the Champagne valley from Epernay where the famous champagne caves of Moët et Chandon were located, we had first to go to Paris by train.

Taking advantage of this, we had arranged a demonstration at Fracture Hospital 76 by Lieutenant Colonel W. L. Keller, well-known American surgeon, a member of my Corps. Here it was that we first heard that compound fractures in this war were no longer a source of high mortality, and were shown why. Keller, practically single-handed, had dotted Paris with small groups of women for making larger first-aid packets, those manufactured for us back in the United States being for rifle bullet wounds and too small for the huge lacerated wounds caused by shell fragments. This work was completed just in the nick of time before the second battle of the Marne, and thus saved many a man from gross soiling of the raw tissues.

On arriving at Epernay, a lovely little town badly man-

gled by a brief visit from the retreating German Army after the first Marne, I received an invitation from M. Chandon. Would I and my officers pay him and his champagne caves a visit that afternoon?

Under his superb palace lay fabulous kilometres of wine caves, where millions of bottles of champagne were said to be stored. (Data concerning kilometres and quarts of Moët et Chandon are merely conventional, like guesses about how old the world is.) We descended by a gentle slope to the caves, which were more than thirty feet underground and well lighted by electricity. In atonement for the potential sin stored up in these catacombs of liquid perdition, M. Chandon remarked: "These caves have saved a good many French lives, as they are absolutely shellproof. I opened them for the populace to take refuge in during Epernay's particularly bad bombardment."

"There must have been a great deal of confusion to get them through this narrow entrance," said I.

"That caused no trouble," said he. "They did that fast enough for themselves. No indeed, the trouble was not to get them in. The real trouble was to get them out again."

Later, we conversed amiably in M. Chandon's magnificent private parlour in his house above ground. When I thought it was time to go, M. Chandon said something rather indistinctly. Now I never knew it before, but it is uncanny how quickly an American seems to be able to acquire a foreign language. Up to this time I had been interpreting for my comrades, who had protested that they didn't understand a word of French—yet to a man they had understood what M. Chandon had just said!

As a matter of fact, I was seemingly the only one who had not understood him. Of course it was extremely warm in that parlour, and stumbling about in the stuffy caves

might have helped them to comprehend his humane purpose. Finally, however, I grasped the situation and gasped out something for which I have been sincerely regretful ever since, to the effect that there had been an Executive Order forbidding us to drink alcoholic beverages while away from home. We filed out into the brilliant sunshine and wound thirstily up through the glorious vineyards of innocent grape juice toward our destination at Bouleuse. We felt virtuous but somewhat depressed—all save a few, who, while roaming through those cellars, had demonstrated other remarkable traits of Americans: their admirable presence of mind and their rapidity of action.

The French School for Medical Officers of the Fifth Army, which they had designated the *Centre Scientifique*, was accommodated in a large Evacuation Hospital, or "H.O.E.," of 3,275 beds at Bouleuse about twelve kilometres behind Reims, and, as at Bethune, within sound of the guns. It was of Adrian barracks, connected by board walks, and the grounds were tastefully laid out in flower beds. The site was a rolling *prairie*, or plain, of the Champagne province, and a spur of the railroad connected it with the trunkline for the evacuation of patients.

The barrack buildings were grouped according to the type of cases treated therein, and we were assigned quarters in the section devoted to the treatment of "frozen feet," or at least that is what the sign on our barrack said: "*Pieds gelés.*" Some of our officers were inclined to be extremely suspicious of a subtle "*despise*" in the sign; but they were appeased, however, by the explanation that nothing personal was intended; that this was the usual term for trench foot, because its characteristics were those of frost-bite.

Each officer of our group was assigned a separate room with a wire-spring bed, a wash basin, a looking-glass, and the most diminutive stove on which mortal eyes have ever

focused. When filled with coal (a teaspoonful or so), it would promptly work itself up into a white heat. It warmed the room, in time; but for heating the human body it was like hanging over a red hot poker.

The course given us consisted of demonstrations in laboratory and operating room, rounds in medical and surgical wards, and so forth. The *dejeuner*, or midday meal, was followed at two and four p.m. by two-hour lectures, and after dinner I gave my men in English the substance of what had been said in the afternoon *conférences*.

In the early morning hours we were privileged to watch the operating on wounded who began to get in about midnight from the trenches. One night I was called to witness Lemaitre's operations. With Lemaitre a little behind me, I entered the waiting-room for recumbent patients. There lay a huge fat French soldier with one of the most terrible wounds I had yet seen. What must have been an enormous piece of shell had torn away the greater part of his right buttock. He was being dressed at the time, preparatory to operation, and was bleeding profusely. In the exhaustion stage of haemorrhage, he was continually rolling from side to side, begging for the doctor to come and save his life. He was deathly pale, his eyes lustreless and sunk deep in his head, his hands icy, his pulse running 180 and hardly perceptible.

I signalled to Lemaitre to come and look at him. The man noticed me do so and promptly redoubled his efforts to attract attention.

To my utter surprise and disappointment, Lemaitre, after feeling his pulse, roughly threw aside his hand, turned to me, and said: "C'est le grand couard!"

I said nothing. But the wounded man was furious. Lemaitre walked indifferently away. I remained behind, and soon the man's entreaties were so heartrending that I sent

for Lemaitre once more, thinking that some mistake had been made.

But no sooner had Lemaitre clapped eyes on him again than he fell into a terrible rage. He called this poor suffering man every barnyard term in the French language of abuse, from *canaille* to *cochon*.

Astounded, I walked away with Lemaitre. When we were out of hearing, he said: "Go back and take his pulse, and let me know what it is."

I went back and found that a miracle had been worked. The man had half risen on his elbow and was shaking his fist in the surgeon's direction. I could not believe my second-hand: pulse rate only 120 per minute!

I returned and made my report, whereupon Lemaitre remarked: "You may have him brought in now."

And he was successfully operated on.

Lemaitre explained the phenomenon to me. "You found the man in deep shock. Now, as most of us agreed the other day at the symposium, in such cases there is an insufficiency of secretion of the suprarenal glands, and those glands are what raise the blood pressure, which in turn raises the man's spirits. It is the organ of all organs called upon to function at highest velocity during a battle. It is the gland that is awakened by rage. Had that man still some of that function left, his blood pressure would rise, and he might stand the operation. I sized up my man well. He's a fighter, and nothing makes him so mad as to be called a coward; and that's what I called him, and grossly insulted him to boot, to get the result I got."

Truly, Lemaitre was a great man, and his greatness was not limited to surgery.

Unhappily, the conferences at Bouleuse were given in French—good French, spoken by the most highly cultured practitioners of Paris and Lyons. I was interested to ob-

serve the effect of these conferences on some of my American brethren whose vocabulary was limited to the phrase-book or worse. French is a soothing language to those who know it not, and, when combined with the effects of a tremendous midday repast and a warm room, it steals over the seething brain like cloud gas. It was most entertaining to see the lights of intelligence go out one by one in the eager young faces, to note the film come over the eyes, the purplish and perspiring countenance, the deep and laboured breathing, and, eventually, the transformation of an alert and gallant military figure into a sodden mass of inert clay, in which the only sign of life was an occasional choke.

2

Bearing in mind that this centre carried its character in its name, "The Scientific Centre of the French Army," we were entirely prepared for the attitude in which we were received. They were all anxious that we should know how to take care of our charges: the wounded soldiers. And they were equally anxious that we should recognize the part France had taken in formulating these doctrines.

One Sunday afternoon, a lovely sunshiny day, Lemaitre, who was a blue-eyed, fair-haired Gaul of about forty, with a sweeping mustache and a charming smile, came up to me and said: "How would you like to run over to Jonchery this afternoon?"

I replied that I should be delighted. This was the famous Lemaitre, whom I have already shown under very different circumstances, surgeon of this centre and reported to have been the originator of the "primary suture." Wherever he went he practised his "sterilization of war wounds by the knife," which revolutionized the surgery of war. His technique was accepted by all surgeons, from the North

Sea to the tip of Italy's boot and on both sides of the lines, just in time to save untold thousands of lives and prevent incalculable suffering.

Jonchery, a pretty little French town, sadly shelled but still charming, held for me the most historic spot on the Front. For this was the town where Lemaitre had worked out his "primary suture." Here was the tidy but tiny field hospital where this work was accomplished; and here, in the presence of the little band who had stood at his shoulder from the beginning, he told the entralling tale.

He was in the retreat from Mons in Belgium, and noted with sorrow and dismay the frightful toll which gas gangrene was taking from the French Army. At that time, military surgery was dominated by the experiences of the Boer War, i.e., that bullet wounds were aseptic and that all that should be done was to seal them with a sterile first-aid dressing. These, therefore, were the existing orders in the French Army; and treatment by operation, or the "open" method, was prohibited save in cases of cranial or abdominal wounds and of those requiring amputation. Shell wounds, since they were much too open to be sealed, were often packed with gauze and wet with antiseptics. As a result, after twenty-four to forty-eight hours, fever set in, pain became severe, and an abundant flow of foul-smelling purulent fluid evidenced the onset of violent inflammation.

Surgery now had to be resorted to. Multiple incisions the first day were followed by more the next. Either the general condition became alarming and gas gangrene sped through its fatal course, or else long-continued suppuration, often interrupted by secondary haemorrhage, immobilized the wounded man. Indeed, if such men lived, they were usually cripples.

In those two months of constant movement, from the

retreat from Belgium and the battle of the Marne to the battle of the Aisne, a period lasting to the middle of November, 1914, Lemaitre did no surgery. He was unable to do more than watch and think. But something had to be done—military surgery could not be allowed to go on that way any longer. Reasoning from a purely scientific standpoint, he came to this conclusion: that, since gangrene was acute decomposition, and since putrid gangrene meant bacteria which flourished in absence of oxygen on dead tissues, therefore the removal of such tissue would solve the problem. And thus was born in his mind the remedy.

"When it was all worked out in my own mind," he said, "I resolved to ask for an isolated little field hospital under fire, where I would not be under the eye of prying inspectors and suchlike and could quickly work up enough cases to awaken the French Medical Corps to a realization of the facts.

"This is the hospital I got, and these good friends of mine," putting an arm around the shoulder of the two on either side of him, "are the men who stood by me through all those dark days. Only the non-transportables were sent me, but by July 15, 1915, the technique was completed."

In all, he had 4,227 wounds to treat. Of these, 2,537 were united by primary suture—and over nine-tenths of the 1,555 of which he had record healed without suppuration. This included 87 wounds of joints and 263 compound fractures.

Now let us see by what procedure Lemaitre revolutionized war surgery.

The soil of France is loaded with the accumulation of century after century of human and animal waste. Among the innumerable varieties of bacteria (the majority of them harmless) are some which cause pus, others which produce lockjaw, and still others which bring about gas gangrene.

The ones which cause pus are common, are found everywhere, and the worst of them, the Streptococcus, causes nine-tenths of the serious wound "infections" and blood poisoning. All of them are great consumers of oxygen. When they and many others, which but for this are harmless, have used up practically all the oxygen in the depths of wounds, then it is that the other two varieties and their near relatives begin to flourish and produce their effects, for they live on dead tissue and will not grow in the presence of oxygen.

In the case of lockjaw, everyone knows what those effects are. But gas gangrene was a new menace in this war. It was due to the fact that there had come on the scene a high-powered projectile whose jagged edges and terrific velocity killed directly and indirectly by shocking to death the tissues immediately surrounding the track of the missile.

To seal such a wound, naturally, was to seal the fate of the patient; for the packing shut out the little oxygen that might have reached the bacteria and stopped their development.

Lemaitre decided to take every one of these wounded men and cut out all of the dead and dying tissue, just as one would cut out the bad place in an apple. After a general anesthesia, the entrance (and if there was an exit, then the exit also) of the projectile was painted with iodine. With a pair of forceps the skin at the entrance was now raised and an oval piece of skin snipped out by scissors, leaving the entrance in the center. Knife and fork methods were strictly employed, and, although rubber gloves were used, there was no poking about in the wound. These instruments were not used again but were sent back to be sterilized. An indefinite number of tin boxes each containing fourteen artery forceps, one rasp, two pairs of scis-

sors (one straight and one curved on the flat), and one long dressing forceps were all of the instruments prepared.

A fresh pair of forceps and a fresh pair of scissors now went snipping through layer after layer, always skirting the wall of the track and removing all muscle which, when pinched, would not contract, or, when cut, would not bleed. Whenever the edge of a muscle sheath was reached, the tattered portion was cut out and the edge raised to see if any fibres of cloth from the dust-laden uniform might have lodged there to initiate one of those infectious processes due to the germs of death in the soil.

When the bone was reached, all pieces not covered with the fibrous sheath known as periosteum, the source of new bone, were removed. By observing the two marks placed on the skin by the radiologist, the piece of jagged metal was next localized and removed. All haemorrhage was stopped by carefully tying arteries and small veins and by using hot water for capillaries, in order to avoid blood clots which might serve as a breeding-place for any organism that by chance might have remained. The whole of the interior was now painted with iodine, and absorbable sutures were carefully placed so that on tying they joined cut muscle to cut muscle, snipped sheath to snipped sheath, until not a crevice remained for the collection of fluid. With deep curved needles a non-absorbable suture was now placed. In a hospital where there was a competent bacteriologist, cultures were made from the depth of the wound before painting with iodine; and if by morning the Streptococcus did not make its appearance, these last sutures were tied, thus hermetically sealing the wound.

This was known as the "delayed primary suture." But in certain cases in which there had not been much soiling and in which the operation had progressed without a doubt in the mind of the operator as to infection, all sutures were

tied on the table at the close of the operation. In this latter case the technique of the "primary suture" had been followed.

The astounding results of this technique in 2,537 cases left the Inspector General of the Medical Corps thunderstruck. When he found that, instead of evacuating patients to hospitals in the zone of the interior to suppurate and many of them to die, as was the rule at the beginning of the War, *Lemaitre had not one single case of gas gangrene, and was returning these soldiers to duty at the Front in from fifteen days to two months*, he could not, he dared not object. Had that Inspector General made his visit a couple of weeks after Lemaitre had begun, he would have placed him under arrest for disobedience of orders and for deliberately risking the lives of French soldiers by experimentation.

The news spread like wildfire, not only over the French Army, but also to the Italian and British Armies, and, by captured medical personnel, to the German Army likewise. This is the first time in the history of medicine, so far as I know, that a great life-saving principle has been adopted immediately without question or quibble.

At a bound, the Medical Sciences had become an integral part of the military machine. The Medical Department of an army, as previously observed, is no longer merely a humane society. The Medical Department has become the salvage corps for men. Now rapid transportation and adequate personnel to clear our battlefields promptly, and operating units placed where they can prevent disaster, are imposed on armies by the progress of science. These services are now *part of the army*; they are no longer appendices, as in the time of Ambroise Paré.

The question henceforth was not to get the man back when every other military necessity had been attended to,

but to get him back at all costs within twelve hours, before germs should begin to get a good foothold. From that time on, reënforcements were obtained chiefly by preventing infection in wounded men. The movements of ambulance companies were militarized. Special roads were assigned them when possible. Every vehicle in the army that could be so used was encouraged to help get those men back. The number of stretcher-bearers increased, and Medical Officers for the first time began to see themselves with a command, with definite duties on the field of battle.

Incidentally, a more far-reaching effect loomed up: the majority of those suppurating bone infections with crippling, which were the eyesore and the pity of the nation for fifty years after each great war, were eliminated by one finding of scientific medicine; and the pension list bade fair to be substantially reduced.

It is not easy for one to evaluate services in science. It has been said, too, that Duval applied the technique of the primary suture prior to Lemaitre. It may be so. . . . I think all will agree, however, that this service stands out in dramatic importance as one of the few palliatives produced by the most foolish and most cruel of modern wars.

3

Leriche was Lemaitre's intimate friend and co-worker. Leriche was a bundle of energy. He was a red-headed little fellow, witty and jolly at table, rapid and sure in operation. He was easily the best bone surgeon at Bouleuse, and his history since the War has shown his worth, for he is Professor of Surgery at Strassbourg and is the leading authority in the world on skeletal injuries. Strange as it may seem, he strongly opposed the primary suture for

compound fractures of the thigh, while he practised the delayed primary suture with scrupulous exactness.

The quietest man at Bouleuse, and yet one of the most tender-hearted and beautiful characters, was Tissier, the bacteriologist of the Institut Pasteur. This mild-mannered man, small of stature, timid in giving his opinions, nevertheless formed one of the four who made the primary suture the uniform procedure of every operating table of every army that took part in the War. Tissier represented that marvellous French school which simultaneously paints a clinical picture and leaves one's respect for cause and effect entirely, wholly satisfied. Everything was orderly—historical data, classification, and the relative importance of things and their relation to each other. I had never anywhere heard such clear exposition. These men never had one moment of hesitation. They were totally convinced that they had exhausted their subject. And this was very nearly true. There is no reason for my attempting to translate into workaday language the thoughts of these supermen in science. But I cannot refrain from testifying publicly to the greatness of their minds and their spirit.

The fourth and last of this natural group was Policard. I say this "natural group" because, through their mastery of four comprehensive specialties, they embodied what the scientific center at Bouleuse has left that is precious for Medical Science.

Policard was a pathologist. I had learned, when a medical student, and later when a struggling young practitioner, to fear and hate the pathologist. In the first place, nothing interested him that was not dead, and I loved life and hated death sincerely. But Policard's idea of pathology was not the conventional one. His interest lay in demonstrating the rationale of pathology: in pointing out at every turn

how the findings of pathology might be applied to the saving of life.

To accompany him on a trip through a man's thigh behind a piece of jagged metal was like making a journey into some tiny place by first reducing oneself in size as did Alice when she partook of the bottle that said "Drink Me." Only when one's size did not exceed that of a blood corpuscle could one enter Policard's garden of beauty and horror combined. He described a thousand ways of death for cells that accidentally strayed in, as well as for those which were born there and could not get away—death by strangulation, death by over-crowding, and death for lack of food. A cell that was struck by that hissing piece of jagged metal was crushed, exterminated. But the cells that were not struck, the cells that were, as one might say, two or three blocks away—why did they die?

"Why," said Policard, "they were shocked to death! There was such a molecular trembling as to shake the very life out of them."

And then followed his description of the stealthy invasion of this disrupted community by scavengers, by ghouls, by races that were born only to poison, to kill; how they banded together; how little by little they sneaked up those great highways of life, the blood vessels, and infiltrated far-distant, healthy organs. He explained that only when a cell was dead could it nourish those harbingers of death, and that far ahead of them went poisons whose work had been done by the time the real criminals got there, so that from that point they could gather force and go on further.

By the time these four men had ceased expounding, we had caught the divine flame of Bouleuse. For me, this was the crucial moment in my life at the Front in the Great War. I knew now what I was doing. And I knew now what I had to do. I had to give this gospel to the great

American army that was waiting to hear what we had to say when we returned from the Front. Not the Front of this war, but that Front which is still daily being pushed back into the infinite, horrible and splendid, whence come these problems of life and death.

Just before we went out to spend three days on the line at Reims, there came to the *Centre* an old gentleman, a frail old man in the civilian clothes of an Academician, and I was introduced for the first time to the man of whom the whole world is talking now, M. Charles Richet, eminent physiologist, and professor in the Faculty of Medicine at Paris. He had the face of a veritable apostle, thin and marked by lines—although pleasant lines—but it was the eyes of Charles Richet that looked right into you and warmed your heart. We very soon fell into pleasant conversation, and here began a friendship that has lasted till now; for between us there was a bond of sympathy not easy to describe.

I was told that they could not keep the old man away from the Front; that he had plunked around in the mud and the cold, and had rolled his poor old bones in a blanket and slept among the Poilus. They had pinned him down now to preside at a symposium on wound shock.

On the afternoon of the symposium there were present about a hundred of the most famous specialists in the French Army. Each one gave his own particular idea of shock. The neurologist brought it down to nerves; the surgeon, to mechanical injury of the tissues; the hematologist, to the mysterious secretions of the endocrine glands—and so on. They all spoke from five to ten minutes, as though they would never have done; and save for a few cardinal points, all were in hopeless discord. But M. Richet had a very different idea from them all:

“Whatever name you may give it, gentlemen, a collapse

of the spirit of man is the key to the situation. This is what distinguishes us from the animals, this spirit of ours, and when that is exhausted life ceases, although the heart may beat on for a time. A thousand things can hasten that end, and many things can stay it. But my earnest appeal to you all is to keep up the spirits of your men, to give them all the rest you can, to make them as comfortable as you can, and to make them see that after all it is the beautiful things of life, the fine things that raise man in his own estimation of himself, that make life worth living. Even then, tremendous shocks may bring death. But the key to the situation is the spirit of man. Please remember that."

We shall meet the old gentleman again. I saw him every day of my life in my mind's eye from that hour on.

4

The firing-line at Reims ran through the city, the cathedral being the dead centre of no man's land. To this point the four of us—Colonel Regaud, Colonel Thooris, Major Collin, and myself—wended our way on January 27, 1918; a way which became more and more intricate, more and more eerie, as we made progress through backyards, across avenues, under twisted tracks, at times through the basement of municipal buildings, but always at the bottom of a deep trench, the communicating trench winding across the deserted crumbling city. The firing came nearer and nearer, and by and by we reached what looked to me like a coal chute into which we descended on a slope of about thirty degrees to enter a cold dark excavation. This was one of the Battalion Aid Posts.

I found the battalion surgeon in this post. Major Collin said in explanation: "There is no time for a battalion surgeon to wander around on the firing-line in order to in-

dulge his superannuated romanticism, as the men will be left without a doctor at the place where they are told to go and find one."

I asked how deep this dugout was. He replied: "Ten feet of head covering." And he went on: "As you know, a gas alarm produces great excitement, and the men come piling into this station at a great rate. There is only one thing to do, or your station will be overwhelmed. Make them all sit down and allow talking only in whispers."

In fact, gas was the one ever-present bugaboo in the minds of all in the vicinity of every Battalion Aid Post. The curtains placed at the entrance to intercept gas were soaked with a solution which counteracted its effects, and a spray was used inside the dugout for the same purpose. Mustard gas simply called for change of clothing and alkalies. This was done here, unless the station were crowded; for then the mere entrance of a man who had been mustard-gassed would contaminate everything and everybody. But for the chlorine-gassed, it was here that the tragic moments were passed, and there were only two exigencies for every case: a bed to lie in and oxygen. In periods of great anxiety, however, many a man's life was saved by bleeding.

"The great question," said Major Collin, "is what to do with the slightly wounded. Should they be evacuated? If one is too indulgent here, there will soon be very few men left on the line. It is necessary, however, to comfort these poor devils and give them temporary refuge. They should be warmed and fed and, if possible, allowed a few hours of sleep. This," he continued, "should include tired transients, passing messengers, and stretcher-bearers, who would like so much to take advantage of the comforts of an aid post. Thus the Surgeon takes a real part in the life of the regiment."

The next morning we left at six-thirty a.m. to visit the system for the Medical Services in the environs of the city. It comprised a typical Regimental Post, two Battalion Aid Posts, two special advance surgical posts, two advance and one central G.B.D. posts, and an *Ambulance triage*. The road over which we had to go was in plain view of the enemy, but it was so camouflaged that artillery fire was fruitless unless aircraft signaled that it was occupied by troops. We made our visit at a time when such visits were supposed to be dangerous: the division was being relieved by another, and evidences of enemy activity were heard ahead.

After motoring for four kilometres we reached one of the advance G.B.D. posts. This was directly on the main route of travel between front and rear. It was thus pretty near the line, but was protected in a sunken cut into the inner faces of which were sunk the dugouts comprising the station. Here had been placed a special hospital for non-transportables, with eighteen feet of head cover. Although thus in the depths of the earth, it had large wards of twenty beds and a neat operating and sterilizing room lined with corrugated iron, painted white, and lighted by electricity. It was dedicated to the reception of non-transportable chest, abdomen, and shock cases. I asked M. Thooris the source of the electricity, and he replied:

"With every division we have two field hospitals, one for *triage* and one for emergency surgery on non-transportables. The latter possesses what is known as a *Groupe Complementaire de Chirurgie*, or matériel for emergency surgery. The dynamo used to run the radiologic outfit is also capable of lighting one hundred and fifty bulbs of thirty candle-power each, and from it we get our light. To the truck carrying this equipment is a trailer packed with instruments and other appliances. When manned

with its personnel, the whole thing is designated an '*auto-chir*.' This extremely important unit consists of twenty surgeons, one consulting surgeon, sixteen men, and eight nurses."

There is no doubt that only the French made a special official provision for a divisional advance surgical unit. In both the British and American Armies such hospitals were always improvised. This was the nearest to the Front that I had seen a surgical unit, and for trench warfare and under such peculiarly favourable conditions, it was certainly valuable. In going from bed to bed and witnessing the exquisite cleanliness and order of this hospital, my eyes testified to what I would have had difficulty in believing: that here we were over twenty feet below ground, exposed to all the drainage and seepage through the filth and refuse of centuries of concentrated population.

We now left our motors, entered a communicating trench, and soon reached a terrain from which all vegetation had been stripped by shelling, as it was territory captured from the Germans. The trenches were much deeper than those we saw in the British lines, well-drained, chalky, and frozen. They were also carefully marked by signboards indicating the route, especially to aid stations. Much evidence of recent shelling was seen and, after walking about two kilometres, we reached the first Poste de Secours (Battalion Aid Post).

It was an old German aid station, with a sheer descent at sixty degrees. How in the world they got a stretcher into it, I do not know. Neither in this nor in the next post was there a gas-proof compartment between curtains at the entrance, and both naturally faced the wrong way. Also, both were small and accommodated but five or six patients, unlike the French-made posts which were usually con-

structed to accommodate sixteen recumbent or thirty sitting cases.

We now began to return by way of the Divisional Field Hospital, or *triage*. This unit consisted of three field hospitals combined. It was five kilometres from the Front, installed in a fine château in a wooded park with more than ample buildings and good roads. There was unusual protection against bombardment, as it was within two hundred yards of an abrupt wooded hillock into which ran tunnels accommodating all patients and personnel. The approach to these tunnels from the hospital was by covered trenches. There were three operating and three sterilizing rooms—part of the Groupe Complementaire de Chirurgie. The wards, served by female nurses, were clean and cheerful, and had been beautifully decorated by some artist Poilu.

Thus we see that the organization of the Medical Services in battle formation is in the shape of an open fan, the outer edge fringed by the first-aid posts scattered at regular intervals along the firing-line. These are the Battalion Aid Posts—one to each battalion. From these like the spokes of a fan run the paths of evacuation of the wounded—the communicating trenches uniting at the Regimental Aid Post. From this point back to the Ambulance Head, or G.B.D. Dressing Station, is the handle of the fan, and this is continued back further still in a solid line to end in the Field Hospital group, composed of the *triage* (or “sorting” hospital) and a hospital for cases so badly wounded that they can go no further without endangering their lives—the so-called hospital for non-transportables. This in a few words constitutes the organization of the Medical Services for battle in the French Army.

Of course, save for those men who were intercepted at the field hospital group, the great stream of wounded now passed in an unbroken line beyond the zone of fire to the

railhead, where the huge Evacuation Hospital, or H.O.E., was located. It was at this point that the stream materially diminished; for the proudest boast of such a hospital was the number of patients which it *restored* to their organizations at the Front. Only those who were permanently lost to the Army, or whose convalescence would probably be very protracted, filtered into specialized hospitals behind the theatre of operations and scattered throughout all France.

When one thinks of the two elements which made the French mobile medical units so complete, one realizes that brains, not money, are required in the science of war. Those two elements were: the Groupe Complementaire de Chirurgie, or portable radiologic and operating unit with collapsible buildings, packed on a large motor truck and trailer; and the Bessoneau ward tent. This last was simply two tents, one within the other and about a foot apart, mounted on steel supports such as those seen in the cantilever bridge. With sanded floors, good white enamelled wire-spring beds, bedside tables, and flowers, the Bessoneau tent presented an imposing spectacle.

During this trip we saw a monument to the type of scientist who invents something or other to make a perfectly simple and easily improvised procedure as intricate and costly as he can, and then besieges the Government with all kinds of letters of recommendation to buy it in the sacred name of Hygiene. There it sulked in solitary grandeur. Anyone who cared to loaf alongside of it long enough, would learn practically the whole keyboard of French profanity from the personnel who were required to clean it and prevent it from rusting.

It was a disinfecter (it is not necessary to mention the type), a monstrous dinosaur said to waddle about under its own steam. It weighed 30,000 pounds and ate up over

1,000 pounds of coal a day. Like a true department-store invention, it combined a hot-air sterilizer in one portion of its entrails with a steam-sterilizer in another; and besides its volcanic smokestack it had a whistle, too, for the purpose of screaming to the Boches to send something over, *please!*

The entire personnel cordially hated it and avoided mentioning it. We had to worm the story of its life out of an otherwise mild-mannered little officer, who spoke in his fury many words we had never heard before, but which apparently were the very heart and soul of the French language.

Chapter XVI

I

THE second and last time we were with the British was at a very momentous period—in March of 1918, when the Germans had decided to make their onslaught upon Amiens. I got wind of this in time to start my group off by way of Paris, where I spent the day in preparing for our trip. Fortunately, I made reservations on the train leaving for Amiens at eight a.m.

At night our group scattered all over Paris in search of pleasure. The city was deeply thrilled by Saint Saëns' "Jeanne d'Arc," a grand opera which had been produced for the first time only a few nights before, and had awakened the wildest enthusiasm. The Grand Opera House was filled, and the curtain had just risen on the second act—an impressive scene laid in the interior of the Reims Cathedral, where Charles VII was kneeling to be crowned, and Jeanne d'Arc with uplifted sword was standing motionless beside him. It was interesting to watch the faces of the French in this moment of intense emotional suspense, for Reims at that very time was in the grip of the enemy and had been battered and burned until it was a mere shell.

Suddenly the curtain descended. A little man in evening clothes stepped rapidly to the center of the stage and said: "Ladies and gentlemen, we request this audience to dissolve immediately without confusion, as by accident the vigilants out on the line failed to notify us that a large air

squadron of the enemy has passed over in the direction of Paris. They may even now be over the city and will naturally try to bomb the Opera, for they must know that this is a gala night. Kindly do not wait for any more, but leave immediately."

And at that very moment, as he ceased speaking, every light went out, and we heard the distant roar of the first bomb on the outskirts of Paris. We were wedged in the center of the orchestra circle, and I expected a disaster from the mad rush of people to escape. But nothing of the kind happened.

A woman's voice rang out: "La Marseillaise!"

And that enormous audience, with here and there the light of a match, arose and sang the "Marseillaise" from beginning to end, the crowd filing out in perfect order thereafter.

Meanwhile, the bombs kept bursting nearer and nearer, and by the time we reached the street there was a continuous roar. All our anti-aircraft guns were firing, and most of our aircraft had risen to take the field. Search-lights were playing all over the heavens, and the streets, despite the danger, were filled with people watching the unusual spectacle. Every now and then there would be a dull roar, and something would go up into the air. But it was not long before a blinding flash and an explosion which brought us to our knees made us realize that the street was no place for us. A bomb had fallen on the handsome glass dining hall of the Grand Hotel where my assistant and I had a room for the night. The streets were absolutely dark, and people were scurrying to their homes or had resolved to see it out at any risk. Far into the night these bombs fell here and there over the city, and from our room high up in the Grand Hotel we could watch, by the bands

of light thrown from our searchlights, little fragments of the desperate struggle going on in the air.

Dawn revealed a dismal and shattered Paris. It was a gray and misty March morning, and a fine rain was falling. At the station throngs of officers, chiefly English on leave, were attempting to board the train for Amiens. Our tickets, of course, saved us, but there was only one seat for the fifty of us, and that seat my officers insisted I should take, as I had spent most of the previous day getting their baggage over from the Gare de l'Est, and I was pretty tired.

I had not been seated very long, wedged up against the window by two French officers of no mean width, when in walked a portly civilian with blue eyes, fair hair, and a blond mustache, accompanied by what I assumed was his secretary, who deposited a portfolio beside him, shook hands, and left. Our compartment was now full, and we gazed lazily at the narrow passageway thronged with excited officers, mostly French. But the current was soon stopped by a huge nurse whose bulk filled the corridor from which we were separated only by a plate-glass partition. Every time a little French officer tried to wriggle past this cork of human flesh, she leant back against that glass panel.

After watching the proceedings for a few minutes, I murmured: "It will be cheaper for someone to give that woman a seat before she crashes."

As I had intended, the only one who understood me was the mysterious civilian, who began to laugh and shake all over. Then I closed my eyes peacefully, in indifference to such trifling possibilities, and soon reached a state of semi-consciousness from which I was suddenly awakened by the crash of falling glass and the heartfelt curses of the French officers in immediate contact therewith. Without opening my eyes, I remarked sweetly: "There, I told you

that it would be cheaper for the company to give that woman a seat."

And then a whoop from the civilian in front and a strong prod from the toe of his boot. "Wake up, Yankee. I want to talk to you."

I opened my eyes and looked at him, getting in return something that the eyes alone, of all the organs of the body, produce. An irresistible attraction, it certainly was. He talked and he talked. He told me all about America which he had just visited, and he was well-informed, with a quaint, incisive humour that was charming and left no bitter taste. But it was not long before he launched into a dangerous subject, forbidden to us all. The high command of the English, he said, had decided to strike the enemy at Metz, making a feint in the Argonne; the French were to hold Alsace and garrison the towns captured in succession as the Germans were rolled back on Berlin; the Americans—but right here I put up my hand and gently remarked:

"My friend, I do not know who you are, nor do I doubt your loyalty to the Allies, but I am sure that a gentleman like yourself will not subject us officers to the disagreeable duty of stopping your conversation. We are not only forbidden to discuss these things, but we are enjoined not to allow anyone else to discuss them."

My civilian friend went white. To say that he was enraged would put it mildly. "And do you mean to say that *you* are going to close *my* mouth?" The implied difference between himself and me was brought out with infinite scorn. "How do you propose to do it?"

Then the good old American blood began to mount in me, and I replied: "I don't know *how* I'm going to do it, but I'm damned sure I'm *going* to do it, if you try to keep on!"

There was a moment of silence during which each

searched the depths of the other's soul, and then his face relaxed, the fine friendly light came back into his eyes, and his jolly laugh bubbled out again. "All right, I suppose I shall have to submit to your ingrowing conscience, but you've missed some damn good pointers."

From there on until we reached Amiens, our conversation was truly interesting and friendly. But I suspected his sanity. How on earth could a man travelling that way know such things and talk so high? My suspicions seemed to be confirmed when, as we rose to leave the train, he scribbled on a visiting card and handed it to me, saying: "Take this to General Haig; and if you've time to go to London after we smash 'em, I'll fix it so that you can have a little chat with his Majesty. I'd like him to know a fellow like you, for you're the hardest-headed American I ever knew, and like all your damned breed you have no respect for God or man, with your crazy ideas of democracy."

I stuffed the card into my pocket without looking at it and immediately set about inquiring for a train to Bruay, the new headquarters of the battle-training unit of the British—for they had been chivied out of Bethune rather unceremoniously. And that card did not come to light again—a very dim light—until several days later, out on the line in the depths of a dugout near Vermelles. I had reached in my pocket for a match to light a cigarette, and my finger struck the corner of the card. Out it came, and by the flickering light I read the engraved name:

LORD NORTHCLIFFE

and scribbled thereover:

"To introduce Colonel Bailey Ashford, M.D., U. S. Army, Medical Corps."

It was the Czar of British journalists whose mouth I had threatened to close. It must have been a novel experience for him, in those days.

There was no train for Bruay, and they didn't know when there would be any. They didn't even know if trains got to Bruay any more. The enemy had broken through on the flank and were shelling the tracks. Nobody in his senses would want to travel in a train to Bruay.

As I turned away, the officer in the ticket office, seeing my rank, called me back and added: "I am sending one officer up to-night, but it's a train loaded with dynamite and shells, and it's his funeral, not mine. You might go with him, if you're longing for Paradise."

I had a hurried consultation with my officers and told them I was going on alone that night and that they should stay wherever they could until they heard from me. Then I made my reservation, and soon found myself in a third-class car mid-way down a mysterious line of closed and pad-locked freight-cars, the train sitting off by itself in solitary grandeur. I tried to make myself comfortable on a hard wood, straight-backed seat, none too clean. Every now and then one of the guards would pass the window and remind me that there was always time to get out if I wanted to, but I sought refuge in sleep. It was useless to do any thinking. That was the last thing one should do under the circumstances.

I was awakened by a hollow ghostly cough. It was pitch dark, and the train had stopped—one of its innumerable stops as it crawled up toward Bruay. I lit a match, which I had been told not to do—but there was no one in the compartment. Then I looked around. Up near the roof was a diamond-shaped ventilator. I waited, and again came the cough. Yes, someone was in the next compartment. I couldn't get in there without going outside, and

the guard had locked me in, so I grasped the edge of the diamond-shaped opening and pulled myself up.

There, huddled in a corner, was the most amusing figure that I had encountered in all of my experiences in France.

The noise I had made in bumping up the side of the compartment had evidently awakened him, and, by the light of a match he had just struck to light his pipe, I saw a Scotch Highlander with his short skirt pulled down as far as it would go, which was not below the knee, revealing in all their nudity two muscular legs blue with cold. With his rakish cap and its ribbon stuck over to one side of his head, and his equipment piled all over him, he was the very picture of despondency. There he sat and shivered and coughed. I shouted out:

“Hello, Scotty. Want a drink?”

He opened his eyes and looked wonderingly in the direction of the voice. “Scotty hell!” he replied. “I’m a Canadian with monkey clothes on. These God-damned English will be the death of me yet. What I want’s a blanket for my legs.”

We tried to get the blanket through the hole but found it necessary to destroy the railway company’s provision against intrusion from one compartment to another. Having once enlarged the opening for a blanket, we concluded it might be as well to finish the job, and it was not long before we had turned these compartments into a sort of double compartment, and conversation became animated.

I never saw him again, and, judging from where he went, I’m afraid I never shall, but if his eyes ever rest on this I hope he writes me.

We took all night to make that sixty miles or so, and it got more and more interesting as we neared the line. The railroad was certainly under fire all right, and, if it hadn’t been for my Canadian friend, I am sure some of those shell

explosions would have perturbed me not a little. But nothing happened, of course, and I was met at the station by the smiling face of little Cowell, General Thompson's Adjutant. He seemed so inordinately glad to see me that I was puzzled, but when he told me what they'd experienced since my first visit I realized why: I more or less personified the established order of things. Here I was calmly bringing up another group of officers to receive a course of training from men who had just been through hell; and the very fact of my coming restored his equilibrium and his faith that the world had not yet come to an end.

They had had a terrible time in the retreat from Lillers, and, after everybody had gotten away, they found that General Thompson was missing. They went back for him, and sure enough there he was, swearing vigorously because he couldn't find transportation for a few wounded whom they had been forced to decide to let fall into the hands of the enemy. And as General Thompson was unwilling to leave his wounded peaceably, they had had to carry him by main force. They had just gotten away in time, too, and had to run for it at the end. "But now," said Cowell, "we have managed to settle down again, and we have a bully program for you. So telegraph for your men to come up at once, and we'll start out on a practical course right away."

2

General Thompson had a violent hatred for "scrimshankers who are always trying to scheme." He said he didn't like Medical Officers who are always lolling around in their aid posts underground when they ought to be filtering about among their men. As we have seen, the French idea was exactly the opposite of this.

Captain Griffin of the Medical Corps was much more

specific: "When an attack is imminent, the Medical Officer should ask permission to speak to the men. He should see that everyone has his first-aid packet, and that gas-masks and helmets are in good condition. He should tell them to grease their boots well and should caution them against drinking water in the German lines. Then he wishes them the best of luck and tells them that he will always be near when they need him.

"He should speak also to his regimental stretcher-bearers, and remind them of the gallant history their predecessors have left them. He should tell them that he will always be on hand, and that he will not send them anywhere he would not go himself." He added that stretcher-bearers are just what their officers make them; that when they deserve it, they should always be praised—and promptly.

The battalion M.O., it might be well to add, should know every turn and twist of the trenches, and should even try to get an idea of the enemy positions. Besides, he should get used to fire by getting under fire. He should remind both his officers and non-commissioned officers that they should not spread alarmist reports, but should go themselves and find out what the real situation is. The best cure for fear, which is liable to steal over anyone, is to get out on the line and remain in the companionship of brave men.

Sometimes we limit ourselves to an analysis of the purely medical or surgical aspects of our profession in war. Colonel Gordon Holmes, a real authority, told us that shell-shock is by no means necessarily an evidence of cowardice or malingerer and that often half of the shell-shocked would be found to be wearing decorations for bravery in the presence of the enemy. Some of them were even wearing the Victoria Cross. They were best re-conditioned in

a Convalescent Camp by the judicious use of a "jolly hot faradic current of electricity," and shell-shock was best avoided by sending over-tired men to the Division Rest Station. The Corps had two such rest stations, holding from five hundred to a thousand men, for the express purpose of preventing shell-shock by timely resting. Men were kept there for about two weeks and had mild, graduated exercise.

One morning we started out on a trip to the Vermelles Sector. Lieutenant Colonel Gray, in charge of the Advance Dressing Station, was designated to take us through. He told us that the Germans were "very kind" and permitted his stretcher-bearers to carry wounded in the open in plain view. As we passed the Main Dressing Station, however, Colonel Shannon, the Commander, "wanted to shake hands with our gallant officers." He said that the last American outfit that passed through there "was damn badly shelled, y'know," and he hoped that we would get off better.

Vermelles was a real wreck. Once it was a good-sized town. Now there was not a house that was not in ruins. They were mere heaps of bricks, and the whole area was peppered with shell holes. Not a tree had been left standing. The Advance Dressing Station was (where else could it have been?) in the cellar of a demolished brewery. Its Commanding Officer wanted to turn this hospitable ruin into an advance surgical station. The poor devil was tickled to death with his wreck and spoke of it in the same terms one would use with respect to "my manor house and grounds." He pathetically remarked that this was the most space and comfort that he had had in this war, and that he actually had a room of his own.

Some day the Boches will drop a pill on this place, I

thought to myself, and leave merely a hole behind 'em; for after all it was only splinter-proof.

After a little pause he added: "We can even grow flowers and things here, just to take our minds off . . ."

But one look around convinced me that horticulture was as liable to take his head off as his mind.

At this point we entered the trench—all, that is, save the Commanding Officer, Captain Earwood of the 42nd British Division, and myself, who chose to walk to the first relay post, about a thousand yards distant, in the open along the road said to be respected by the Germans for men carrying wounded. Soon we passed under the shadow of a tower, which was nothing but bones, so to speak—picked dry.

Captain Earwood remarked that the Germans were certainly peculiar people. "They take a dislike to certain things and never get over it. Now they have an intense hatred for this tower and shell it mercilessly four days out of seven, though no one ever comes here, nor is it ever used for anything."

This was evidently one of their "hate days," for no sooner had we stepped past into the Bearer Post than they plunked another one into it. We walked up the communicating trench to the tune of "Minnies" screaming over our heads, until we reached the Regimental Aid Post some five hundred yards from the German lines.

This R.A.P. was about the only safe one we saw. In common with the tunnel of which it was really a part—a tunnel which, with all its ramifications, was said to be about twenty miles long—it was thirty feet underground and perfectly protected from the heaviest shell. The Medical Officer had a wonderful little room of his own there in the depths of the earth, with solid mahogany furniture and a huge bed which they had raked out of the ruins of Ver-

melles. The walls were adorned by anatomical studies from *La Vie Parisienne*.

The tunnel, which was straight, stopped just fifty yards short of the German line. Here we rose to the surface and took a close look through a crack in the trench parapet at the slag heap on which Mr. Boche was perched, and from which in places he was able to gaze into our very souls.

Our last experience at the British Front was of great professional importance; for it was then that we met Major McNee.

Major McNee was a scientist who had accepted from a strict sense of duty his fate in being bound to a hospital or laboratory, instead of being in the lines with his men where he wanted to be. He resolved that if he couldn't be great in the way he would like, he would be great in science. And he was. For it was Major McNee who clearly conceived the idea that trench fever was carried by lice. But when he had gone through all the heartbreaking work preliminary to his final proof, he found not only that the British Army would not permit him to use men to prove his theory, but also that it would not even allow him to use men who would volunteer to be experimented upon.

Now, when he was visited by Lieutenant Colonel Richard Strong, M.C., U. S. A., and seeing that the American Army would permit volunteers to offer themselves for experimentation, McNee did one of the grandest things a scientist can do: he turned over to Strong every bit of information he had on the louse versus trench fever. All Strong had to do was to put on the finishing touches, by actually infecting uninfected volunteers with lice that had fed on the blood of the sick a certain number of days previously. This was done at the General Hospital at Saint Pol.

Strong, of course, did not fail to say what he should have said by way of attribution; but McNee eliminated himself as completely as he possibly could, and allowed the scientific world to acclaim Strong.

The last night at Bruay was never to be forgotten by any of us. That night we gave a banquet to General Thompson, at which all of the British officers who had taken part in our battle-training were present, from near and far. Just when the evening was at its height, the lights suddenly went out and the bombing began. Bruay, of course, was a big hospital centre, and it was a barbarous thing for the Germans deliberately to have bombed it; but no doubt they were after us. Everybody behaved very well, however; and the Canadian band played "Yankee Doodle" all through the strafing.

3

On the way home we stopped at Boulogne, which, although not really a base, was filled with enormous general hospitals, special hospitals, and convalescent hospitals.

We have at last reached what for me is the very embodiment of the new spirit of my profession in war, the Convalescent Camp. Heretofore, medicine in war had been an agent of mercy, neutralized by the red cross—on paper at least. But military medicine began to look less neutral when, after it had brought every resource of modern sanitation and hospitalization to the battlefields of the World War, and had perfected such life-saving surgery as the primary suture, it instituted Convalescent Camps for the rapid return to duty of men who used to drift into the zone of the interior and become forever lost to the army.

Thenceforth, wars could not be won without the Medical Department.

The result is that to-day the army doctor, though without the right to command troops, is a medical *officer*. His ambulance companies and dressing-stations and field hospitals are fixed in battle orders just as artillery positions are, and their movements are adjusted to strategic requirements. Yes, even by superhuman efforts, which I am proud to say I took an active part in initiating, our General Staff has provided that every American army-division shall have one medical *regiment*.

The first appreciation of the hitherto somewhat depreciated, if not actually despised, "medico" came from the enemy. He did not fail in the least to realize the importance and value of this supposed non-combatant in keeping the ranks full against him, and he rewarded him liberally by shelling, bombing, and gassing him without mercy. Naturally, men are not going to allow science to best them, if they can destroy in time those who apply it against them.

To-day, the Red Cross Society can be considered the only really neutral organization in war. But, if they ran a Convalescent Camp, they would be bombed just as we were.

The purpose of a Convalescent Camp is to provide a point for the salvage of men who would otherwise occupy a bed in a base hospital, or be sent back to their homes, or to some watering-place, where the military spirit into which they have been inducted would be more or less rapidly lost without any real benefit to their physique. The two essentials are that the Convalescent Camp should be commanded by medical officers and that it should supply all the pleasanter features of military life and its comforts without luxuries or vices which pamper the soldier and unfit him for his return to the lines.

For example, Convalescent Camp Number 1 of the Brit-

ish returned 5,100 men to the lines in six months, and Convalescent Camp Number 10 about 1,500 a month. General Burtschaell stated that of 1,015 men at a Convalescent Camp, 756 were returned to duty as Type A men, 127 as P.B. men (to be retained permanently at the base), 123 were returned to base hospitals, and nine sent home to England.

Convalescent Camp Number 10 near Boulogne was one of the best in the British Army. It had accommodations for from three to five thousand men and was out in the open country, surrounded by deep wooded ravines. It was well laid out with roads and gardens, consisted of barrack buildings of wood, and, with the exception of a few details, was built by the convalescents themselves.

It was commanded by one of the most attractive Irish-men that it has ever been my privilege to know. He had only a few commissioned and non-commissioned officers to help him. As he said: "We have from two to three thousand men here to keep movin', and they need room to move in. Practice marches get tiresome after a while."

He led us over to a theatre where an orchestra was playing to an empty house. I remarked on this, and he replied: "This is the hour for them to play, and play they must, audience or no audience." The theatre was well painted and decorated, especially the curtain, which was witty enough in its remarks and advertisements, but could hardly have been swung uncensored from a modern playhouse in a large city. Besides the orchestra, there were four bands, one of them a Scotch bagpipe band, combining all the glory of male and female apparel. He didn't like to have professional entertainers come up and put over their stuff on his men, said Colonel Myles; but: "If you want to see real fun, come over at two o'clock and watch a performance put on by our *own* men."

The Red Cross hut was practically a club, with good billiard tables, neat writing-desks, an extensive library—and all to music by the orchestra. The lady in charge, a pleasant-faced, middle-aged Englishwoman, and the only female on the place, stated that they had a fancy dress ball every Tuesday night, and another dance on Friday.

I said to Colonel Myles: "Who in hell do they dance with?"

"Wid 'emselves," was his laconic answer.

The gardens were cared for by P.B. men only. Such men never went back to the Front anyhow, but they were kept with the Army rather than to let in a lot of labourers without any military spirit.

On the way out we had a look at the barracks. They were all whitewashed, the floors were stained and waxed, and the straw beds rolled up neatly against the wainscoting. In one of the barracks they were painting the rafters a fine seal-brown colour, and I remarked, "Where in the world do you get that shade of brown paint?"

"That ain't brown paint," Colonel Myles replied, "that's crude carbolic acid."

"Godamighty, man," I ejaculated, "do you mean to tell me that you let a soldier lie on his back on the scaffolding and paint the rafters with pure carbolic acid? Won't he spatter it in his eyes?"

"That's his privilege, sir," remarked the father of the flock, cheerfully.

Out of doors everybody was playing some game or other. The Canadians preferred baseball, the Scotch, golf, the English, cricket, and everybody took to tennis, football, boxing, racing, and gymnasium stunts.

I was tremendously impressed by this centre, different from anything I had ever seen. And I think there is only

one word that will describe its leading characteristic: "pep." But, if the truth must be told, Colonel Myles was nine-tenths of Convalescent Camp Number 10. Colonel Myles only needed to step into a group of men, and the effect was electrifying; the responding flash in the eyes and the taut muscles told the rest.

On leaving, which I did reluctantly, I asked him if he didn't have a hard time getting all of these buildings and stuff together to make a village for 3,000 men. He looked at me very long and hard, and replied: "I've lost all the frinds I ivver had in the Army, and I'm afraid to go out of here, because ivvery stick of wood on the place ripresents an argymint."

We visited plenty of Convalescent Camps and depots, all of them different and some of them specialized. For instance, Convalescent Depot Number 1 was used for cases of D.A.H., or disordered heart reaction. There is more plain "bunk" than can be imagined, and in every army too, about these supposedly dreadfully dangerous heart diseases. In a big percentage of war-time cases, they were nothing but the evidence of a disordered nervous system; and here was the place where cases of "nerves" received expert treatment. The patients were organized into ten companies, each of 250 men and each under a Sergeant Major—and the British Sergeant Major is an institution all by himself. The average stay here was twenty-nine days, for men of the type who used to loll around a base hospital, eating the tops of their heads off in worthless idleness, from eight to nine months on end. As I have already remarked, in the six months prior to my visit this hospital had returned 5,100 cases to the front line.

Our last night in Boulogne was spent in the usual way—with a banquet and bombing party. This banquet was given to Sir Bertrand Dawson, but we had some very interesting men in addition to the *homenajeado*, as they say in Spanish; Sir Almoth Wright, for instance, the father of immunology and the modern vaccine.

During the inevitable speeches that followed, Colonel Myles astonished us by rising and announcing himself as a Sein Feiner. Having thus ingratiated himself with the English, he went on to say something which got under my skin: "The Myles family has contributed considerably toward the soldierly qualities of you Americans. I myself had a relative over there who did something or other in that line, and his name was Nelson A. Miles."

The banquet closed with a few remarks on the relative thickness of blood and water, while a few sturdy bombs fell outside; and then we all repaired to our virtuous couches in peace and contentment.

As a result of my short service with the British of the First Army in the winter of 1917-1918, and "in recognition of meritorious services rendered the Allied Cause," I received from the British Government, through the Adjutant General of our Army, the Cross of a Companion of the Order of Saint Michael and Saint George; and I treasure that scarlet-and-blue ribbon as a reminder of comrades around the mess table. I wish that I could speak of them at length. This group of splendid British men had revealed a heart of gold to the handful of American Medical Officers who had come knocking at their door for light in those dark days, when the accumulation of years—yes, of centuries—of accomplishment in science was being spent in the fires of war. From Captain Cowell, true and brave

little scientist, who risked his very life over and over again while penetrating the mysteries of surgical shock, to Captain McDonald, the radiologist who piloted us from St. Omer to Arras in a single day and showed us everything but the Crown jewels of the Emperor William—all can be summed up in one breath: the Lord makes no better gentlemen.

Chapter XVII

I

ON MAY 5, 1918, we began a visiting tour which in range and variety has probably never been excelled in any school for Medical Officers in war. There were forty-four of us on that second pilgrimage to Bouleuse. This course was carefully planned to demonstrate on the field practically all that we had heard during our earlier visit.

Lieutenant Colonel Regaud, Director of the French *Centre Scientifique*, led us gradually from the immense H.O.E.'s and rest-area units out to the firing-line, in a systematic and scientific analysis of facts. Nothing was hidden. The French themselves frankly exposed and commented on defects, generally unavoidable, or the result of unchangeable circumstances. The entire line from beyond Soissons to near Chalons was virtually combed. I shall merely sketch one sector as an example of what in greater or less degree prevailed in the others.

Ever since my arrival at Langres, I had been hearing about two monstrous Evacuation Hospitals in the Champagne; but I was totally unprepared for what I actually saw on this spring morning at Mont Notre Dame, which was the most famous H.O.E. in the French Army. It was a neat and freshly painted village of some hundred and fifty buildings.

There had been much discussion over the mobility or immobility of an evacuation hospital. Some insisted that

it should be prepared to accompany the troops. Others, arguing from the nature of its duties and equipment, held just as firmly that it should be immobilized and made as elaborate as possible; that, if it were lost in the fortunes of war, such a loss would always be less important than the loss of a battery of heavy artillery or a point of strategic importance.

But what really animated the French, in their defence of a system which in the Champagne valley they carried to excess, was their intense patriotic worship of historic Reims, and of that province Champagne which they considered the heart of their country. Thus nothing was too good for the soldier who was wounded in defence of Reims; nor did they believe that even the enemy could be so insane as to dream of possessing himself of the heart of France. Accordingly, they constructed not one H.O.E. but two identical hospitals which, for size and perfection of equipment, were of a type never before employed so near the theatre of modern military operations. From this it was merely a step and then another and another, until the Champagne valley was filled with specialized hospitals, all more or less on the same high plane of excellence, if not of size, as Mont Notre Dame and Traumery. The fearful day of reckoning came when Germany's last great thrust at the real heart of France—Paris—left the French Medical Corps bewailing the loss of 45,000 beds in the valley of the Champagne.

The H.O.E. at Mont Notre Dame could accommodate 5,000 patients, and the nearest front was fifteen kilometres away, or about ten miles. The hospital, burned early in the War, had been rebuilt and opened only five months before our visit. It was destined to be destroyed by bombs again in the fateful push toward Château-Thierry in May and June.

The surgical operating group consisted first of three big barracks connected by a cross corridor. The two outer ones were for the reception of patients; the centre one contained the pre-operating room and the shock room, with a hot room in the back. This admission department was connected with the operating group proper by a corridor which opened into a waiting-room facing a quadrangle, around which were grouped two X-ray rooms, two waiting-rooms for patients whose X-rays had been taken, and a succession of six operating rooms. And in the rear of this quadrangle was a barrack for officers and nurses, and another, with the bacteriological laboratory at one end, for storage of material and instruments. There is no need to say more, as the function of this centre will be readily comprehended. For times of great activity, it was even connected with the railway by a narrow gauge spur.

Such was the exigency of the times that this hospital actually ran a department for the salvage and disinfection of soiled dressings, which could thus be re-used. The hospital garden yielded 25,000 francs a year in fresh vegetables. There was a quarter for prisoners-of-war, in which officers, non-commissioned officers, and men had separate accommodations. These prisoners had every comfort accorded the French, but they were separated from them by barbed-wire fencing.

The slightly wounded were received from the Front in an enormous Bessoneau hangar with sanded floors. The policy was to operate on as many of the slightly wounded as possible in this hospital, in order to avoid sending them further back and losing them to their division. A separate operating plant was maintained, connecting by a corridor with this hangar; and each operating table there yielded eighty operations in every twenty-four hours.

The quarter devoted to evacuation was the very best

seen in any army. As the arrival of the hospital train to remove patients out of the theatre of war might be delayed as much as forty-eight hours, no wounded for evacuation were ever moved from their beds until two hours before the definite arrival of the train, announced by wire. They were then carried to special wards, which were equipped with supports for resting their stretchers till the train arrived. During a push there were two hospital trains a day.

Another feature of this big centre was vital. I have spoken of the necessity of having some evacuation hospitals, at least, kept mobile; and so, near the tracks, were stored for immediate shipment in four enormous Bessoncau hangars four complete reserve mobile evacuation hospitals of 400 beds each, equipped with Bessoncau tents. They were absolutely complete, with dressings and instruments, even to fire extinguishers. When once set up, they could function in every particular. The personnel of each of these hospitals was 200. Of these, one hundred were kept here to ship and the other hundred sent ahead to receive. Each required thirty ten-ton railway cars or one hundred motor trucks to transport.

The stories told about the destruction of this hospital were harrowing; stories of fleeing nurses shot down in their tracks while trying to get away, stories of big wards filled with non-transportable wounded set in flames, and stories of machine-gunning of the officers. One can only hope that these tales have been exaggerated.

After the efficiency and fresh paint of modern H.O.E.'s, I was happy to come upon the peace and quaint beauty of the Abbaye d'Igny. The abbaye, a monastery founded back in 1126 by the Trappists, was still isolated from the world among the rolling grain-fields and tranquil vineyards of the Champagne. It seemed as if I had stepped back into a knightly century long since vanished—though

tradition said that no woman had ever set foot in this sacred spot.

The Gothic refectory was intact, with polished carved-wood window frames terminating above in an arch and extending downwards clear to the floor. Down the centre stretched an imposing table—its surface was a veritable mirror—which one could easily imagine had never been moved from its place since the chapter was founded. Along it in stiff and stately silence stood thirty carved and empty chairs with bowed arms; and at the head was an elevated dais for the Superior. But it was in the gardens, with their blood-red Jacqueminot roses and boxwood-hedged walks, that we caught the full charm of the place. And now this abbaye, too, was given over to the purposes of war: it was a hospital for medical cases, of which it accommodated 600, chiefly in Adrian huts. The only stipulation respectfully made by the monks was that no female nurses be employed here; nor for that matter should anything feminine be admitted.

I caught myself wondering if perhaps this had not always been an isolation hospital. My suspicion was given point by a laughing observation of Professor Tanon, the world authority on *echinococcus* disease, whom I met here. He remarked that he had found the bare cells of the remote inner quadrangle a splendid place wherein to isolate men afflicted with undiagnosed contagious disease.

But I regret to record that this quiet and historic retreat, with its air of permanence lent by the passage of many centuries, was wiped out in a single day when the enemy slashed down through the Champagne valley in the last great stab at Paris.

Not far away was one of those extremely amusing and useful organizations, the travelling bath, known as the *Section d'Hygiène Corporelle*. There were two of these to

a Corps. In no army was bathing practiced in a more systematic way than among the French. Delousing was only one of the by-products of this plant, and was inseparable from it. The whole matter was in the hands of the Medical Department. Heretofore, the bathing of the men of an army had been a haphazard exercise which no one had considered of sufficient importance to regulate; but when it became known far and wide that skin diseases actually furnished more days lost from sickness than all other diseases put together, and that the causes of these diseases were body lice, scabies, and pus-producing bacteria that grew in the normal excretion of the skin, then bathing and the regular change of clothing became a matter of vital importance.

The avowed object of these bathing sections was to "disinsecticize"—disinfect the soldier's clothing, insure his body cleanliness, and issue him clean linen. In the whole process, which is too elaborate to relate here, I have observed but one weak spot: the sizing of the men before bathing. One must be very careful not to lay on the bench of a large man underclothing intended for a small man. I have seen one gigantic Gaul receive the shirt of a five-foot-two, narrow-chested ex-ribbon clerk, have sensed his holy wrath, have heard the argument between himself and the bath attendant, and have witnessed the garment split from neck-band clear down out of sight, simply from a respiratory effort prior to a mighty "ALORS!" by the party of the first part.

2

At four-thirty a.m. of the 11th of May, we left Bouleuse to effect a junction with M. Thooris at daybreak and proceeded by motor ambulances to the Aisne Canal. This sector was strategically the key to the situation on the left of Reims and was completely dominated by the German posi-

tions, which were on high ground and almost semi-circular.

Leaving our ambulances, we set out on foot for a small stretcher-bearer relay station on the opposite side of the canal, near a pontoon bridge crossing the Aisne River. We could appreciate the difficulty and danger of evacuating the wounded from this sector, for the ground was low and marshy, and there was first a river and then a canal to cross. Furthermore, the banks of the canal were lined with our own artillery drawing fire. Therefore all movement of wounded had to be at night. We crossed the Aisne on the temporary bridge which, although camouflaged, was in perfect view and range of the enemy. It had been destroyed repeatedly, and the Germans gave it their most prayerful attention at all times, as we discovered from personal experience. Beyond the bridge, the marshy terrain was crossed by a corduroy road leading to the trenches.

The moment I reached this terrain I was possessed by the idea that I had seen it before, and I couldn't get that idea out of my head. I knew perfectly well that I had never seen it, and yet persisted with my obsession. Finally, I could keep it to myself no longer, and spoke of it to M. Thooris.

He looked at me gravely for a moment, and then asked: "Did you ever read Cæsar's *Commentaries*?"

I answered that I had.

"Well," he said, "do you remember a bridge that Cæsar had to build here to get at the Belgæ?"

I replied that it had taken me the best part of two weeks to construct, as a school exercise, a bridge out of matches and little pieces of wood, from Cæsar's minute description of the structure.

"This," he said, "is probably the precise site of Cæsar's bridge, and we are still after the Hun."

When I happened upon another old monastery, a day or

so later, I asked for a copy of Cæsar and re-read the account of that early battle.

It was rather a misty day, and so M. Regaud, M. Thooris and I got out of the trench and walked in the open where, but for the low visibility, we would never have dared to show our heads. It was a dismal sight under any conditions, but especially so under a chilly, drizzly sky. There was not a vestige of vegetation, not even grass, as far as the eye could reach, and what had probably been well settled with comfortable country homes for centuries was now as bare as a desert. Not one stone was left upon another, the ground was thickly pitted with shell holes, and the wire entanglements of abandoned positions raised their rusty tousled crop in evidence of war's seeding.

Some abandoned tanks, riddled between the lines in a frustrated attempt of the French to break this ugly barrier, lay gawkily overturned like wrecks on a forbidding coast. Suddenly, I was seized with the idea of going out to get a piece of one of those rusty tanks as a memento. And we all started. But no sooner had we come within fifty yards of them than a breeze puffed away the mist and left us, like three blackbirds on a snowy lawn, in full view of the enemy.

M. Thooris and I threw ourselves flat on our stomachs. But something made me look behind, and there stood M. Regaud as straight as a pine, a veritable statue of a disdainful Gaul. He would not throw himself on his face before the Boches. It was foolhardy, but it was grand. Providentially the wind whisked back the mist. And I wrenched loose my piece of tank and have it still.

We now picked up the communicating trench leading to the Battalion Aid Stations, and went through a series of them. Having been captured from the Germans, they all faced the wrong way, and all had steep descents; but once

below we found excellent galleries furnished with electric lights, telephones, stoves, and plenty of supplies. The litter-racks folded against the walls.

The Regimental Aid Station of Major Collin should be mentioned here in passing as the best we ever saw. It had every surgical appliance; and the Medical Officer himself had a full-size bed with bed linen, an easy chair, walls papered with a pretty design, and practically all the comforts of home there, twenty feet underground. Across the way was a kitchenette and dining room, where we were served hot coffee in fancy cups with silver-plated spoons over a clean tablecloth. In short, this was an advance operating unit for non-transportables, in addition to being an aid station. The reason for such an elaborate outfit was evident. Because of the terrain, it took three hours to get a wounded man there from the line proper, only two thousand yards away. They were very much afraid of mustard gas in this sector—and with reason. The personnel wore rubber boots and trousers, closed hermetically by a belt, and a blouse that tied around the wrists and neck.

We had a most difficult time getting back, for an altercation between the French anti-aircraft guns and a German plane had drawn a vigorous shell fire upon the bridge and both banks of the canal. By crossing singly we got over without any mishap, and thankfully regained our ambulances for the beautiful ride in. We received a cordial reception from the officers of the group of field hospitals, who had prepared an elaborate luncheon for us in the grounds of an old château. To our surprise, one of the first to greet us was M. Charles Richet, snooping about the Front in his plain black clothes as usual, utterly unable to keep away from his beloved Poilus. Indeed, his affection now had taken us Americans in as well. There was

never any question of Charles Richet's admiration for America.

The forward operating unit where we had lunch was a good ten kilometers from the line; but a few days before a shell had fallen right into the operating room and killed five of its surgeons, although the place was isolated in a grove far from all ammunition dumps, and was plainly marked with a red cross.

3

The 14th of May was a red-letter day for us all; for then we skirted the rim of the hell-cauldron around Soissons, and so were the last to look upon this beautiful sector, which was swallowed up two or three days later in the last great German push toward Château-Thierry. This was the famous Chemin des Dames Sector, where some of the most desperate fighting of the War had taken place; and this was our first visit to the Sixth French Army.

I do not think that anything we saw was nearly so interesting as General Laznet, who accompanied us. Here was a really progressive man, unhampered by tradition and convention. His whole idea could be compressed into the following creed: first-aid to the injured and gassed as near the line as possible; advance surgical hospitals under fire for non-transportables; and a rapid trip to the rear to the normal center of the Medical Services, the H.O.E. I saw a perfect galaxy of the first two categories, and at the end of the day a splendid Evacuation Hospital.

Soissons. Tragic Soissons. Beautiful it was beyond all description, in a veritable park and surrounded by wooded hills. One could never forget that cathedral and those sedate old residences and luxurious châteaux—the cultural development of centuries—all to be seared in a few days

by the hot and angry breath of war. One little advance surgical hospital, perfect in every particular, equipped with pretty nurses and brilliant young surgeons stirred me to pity, as I prophetically remarked:

“General, don’t you know you’re too near the line?—that you’d never get these women away from here in time?”

But he shrugged his shoulders and replied: “*C'est la guerre!*”

In one place we came upon a G.B.D. *triage* with its inevitable advance surgical hospital working busily in co-operation with the front-line service. These units were huddled into a hollow, stifled by mountainous hills, in the most piteous little abandoned town imaginable. Its pretty houses were all torn to pieces by the awful shelling it had received by indirect fire from the Germans only four and a half miles away. In this place the whole works were underground and, wonder of wonders, reached by an elevator! Some operating was going on when we reached there.

Our party had gone on by a long roundabout way to visit what was perhaps the most advance surgical hospital in the Allied Armies. It was right on the knife-blade of that famous ridge called *Chemin des Dames*, approachable with safety only by the route they had taken. But M. Regaud and I had overstayed our time at this G.B.D. and could not possibly catch them by following them.

M. Regaud, foremost radio-therapeutist in the world and Professor in the University of Paris, was a silent, sturdy, blue-eyed, bearded man of fifty-odd. We had been thrown together constantly through these two sessions at the French School, and the friendship that we had was real.

I had the map in my hand and merely looked at it. He

smiled and said: "I know what you are thinking about, and while I wouldn't advise it, I'll do it, if you say so."

What he had reference to was an alternative that was almost crazy: nothing less than to spin up that road along the knife-blade in full view of the entire German lines, trusting to the Red Cross to get us through. No more was said, and we jumped into the ambulance. Regaud asked the driver if he cared to take the risk, and added: "I won't think you're a coward if you say no."

But he didn't say no. And throwing on full steam ahead, we dashed on to that road, leaving General Laznet with his mouth open.

I secured in that short but exciting ride the most comprehensive knowledge of what the French had been through that I had yet obtained. The heavy forest had been literally shot away, leaving only a pitiful expanse of bare brown trunks pointing heavenward. Beyond this the deep ravines and massive hills were strewn with a jumble of lopped-off branches, trees, stumps of houses, and overturned wagons. In retrospect, this ride was a gratifying experience to have had; for not one or two Germans, nor a company of Germans had respected the Red Cross flag, but the whole Front of the German Army.

And thus we reached Moulin de la Faux, Carrière R-1. This enormous quarry looked as if it could have accommodated untold thousands in its tunnels and arched halls, and, in fact, the Germans used to use it as barracks. The French had had a hard time cleaning it and ridding it of the enemy dead, for it had been taken by hand-to-hand fighting of the most gruesome sort in the darkness. Now, however, the part occupied as a hospital was lighted by electricity, white-washed, and equipped with every convenience. It was perfectly safe *as long as the line held*. For there was at least twenty feet of marble overhead. We emerged from

our inspection in time to greet our perspiring friends, who had just come in over the long route.

From this point we motored slowly down through the forest behind the ridge to the Montaine Neuve, and so descended toward vacant Soissons, with its poor battered cathedral almost ready to drop, its beautiful buildings rent and torn by shells, but its empty parks still filled with bright flowers. There is no language which can describe the awfulness of deserted cities under fire.

In the suburbs of Soissons was one of the six medical centres of the Sixth Army, and a most important one, for here sat the Medical Board that decided on the degree of incapacity of all chronic sick of the Army. It was an ancient château, Vaux Buin, built in the 17th Century, and its grounds were exquisitely beautiful and filled with fine old trees which alone should make the place famous. The real speciality of this centre was its pharmacy; and that was not special except for one innovation, to be piously recommended for all armies—a buffet where men were served hot drinks while waiting for prescriptions to be filled.

It was late afternoon and time to go. I threw one last glance at the gardens of Soissons and, climbing into my car, started back to Bouleuse over a road as smooth as a floor. After about forty miles, we reached one of the most peculiar institutions which an army fighting for its life had ever created: a combination trench-mortar school, school of hygiene for soldiers, and rest station. It was out on a country road, where it had sat down, so to speak, in the lap of a field of barley to listen to the symphony of Nature furnished by the mooing of a hundred cattle, the chirping of birds, and the rustle of a falling stream. The view of the Champagne valley here was superb. The thatched peasant homes, garlanded with roses, the trim vineyards, and the haze of a spring afternoon smiled now

upon us, who since sunrise had been following the mad gallop of the Four Horsemen.

The Artillery Officer in command, who was a bosom friend of General Laznet, taught practical hygiene along with a love of peace and natural beauty on the one hand, and the use of that most frightful of weapons, the trench inortar, on the other. His was a rest station for small organizations of war, for tired little companies and remnants of companies from the Front. He had a hygienic bathing establishment, raised flowers everywhere about it, and had provided his station with a barber shop and a good reading room. It was a stunning example of the French officer's practical creed: to keep up the self-respect of his men, make them comfortable, and show them the beauty of the land they were defending.

Here was also a fine club for officers, well furnished, well painted, and well supplied. It was an ideal lounge in a little old-fashioned village house. Near this was a post exchange, not unlike a large grocery store, which sold fine wines and all sorts of canned food and tobacco at ridiculously low prices. In addition, there was a handsome tea house served by English nurses. These young persons were not exactly hideous, either.

The sun set on us here; and in the twilight, exhausted, we sped past twinkling villages and farmhouse lights to our barrack home. We were stupefied less by the shock of modern war, perhaps, than by the abrupt return to ancient peace.

4

The last day at Bouleuse was spent in a pilgrimage to Reims. For some time we had been badgering M. Regaud to take us to the cathedral, and every time we mentioned it he would put us off with a polite, half-laughing, half-

serious reminder that tourist excursions to Reims were not strictly a part of our military duty; that our relatives might have some difficulty, too, in inscribing our graves as the tombs of heroes who had spilt their blood in defense of their country. In fact, he insinuated that, if he did not happen to spill his own blood at the same time, he might have to explain why he had consented to lug twenty-five perfectly healthy Sammies up to do a little sightseeing in a place which had been evacuated even by the soldier.

But we insisted that it was all a part of our education, and he yielded to the extent of saying: "Well, all right. But only if it's a misty day."

Promises of this sort, however, defeat their own pro-visos. By chance, this last day was not misty at all—it was a perfectly glorious sunshiny morning, without a cloud in the sky; so away we went.

Reims was not a pleasant place to tarry in. Both sides had retired from the town, the Germans in order to get a little long-distance target practice on what remained of the cathedral, and the French better to shoot up the Germans without having to level every house in the city. Only a short time after our visit, the German Army made its advance on Château-Thierry, confidently expecting to engulf the tattered remains of its ghastly work at Reims. But when they tried it, they found there the French Foreign Legion entrenched in every house, with knives, plenty of champagne, and an indomitable spirit.

We left our motors in a little suburb on the bank of the river just before the bridge, and started on foot to cross the city. The cathedral stood out bravely before us, and from our position it did not seem to have been touched. But as we approached across the plaza, the wreck became more and more apparent. The roof had been destroyed; the rose window had disappeared; the arms, heads, and legs

of its saints of stone had been blown off; the delicate tracery of leaves, vines, and flowers so patiently carved in its massive front were chipped and defaced. We walked gingerly in on to its marble flagstones, expecting every minute the fall of stone arches so weakened that it seemed as though a child might push them over, to crash from their dizzy height on to the cracked and débris-covered floor. The tapestries were gone, and gone the high altar of this "*pauvre belle église*," which had become the parish church of all France.

We started back none too soon. On entering the town, we had noticed an enemy observation plane overhead; and probably it had noticed us also, for now the shelling began again in earnest. There was no time to lose among those crumbling façades. An explosion ahead of us quickened our pace, and simultaneously something struck me on the leg. Down I went.

So I had got it finally!

But it did not take me long to find out that I was not badly hurt, for to my intense joy my leg carried me.

When we assembled under the trees on the other side of the river, M. Gibeau, the assistant assigned me by the French Army, came up and saluted: "Colonel, I was behind you when you fell, and I picked up what hit you. Here it is."

I took it from him. It was a "Life of Pasteur," probably blown out of some doctor's office, only to fall thus into the possession of his American colleague who chanced to be but one short hour in Reims during her travail.

When I began at Bouleuse, I flattered myself that I could speak French. At our mess table, however, I realized that

that was a case of misplaced confidence. Here were Lemaitre, the dreamer and realist, Leriche, the bubbling wit, and up and down the line on either side the most distinguished and cultured physicians, surgeons, and scientists of Paris and Lyons, while at the head sat the presiding genius, the grave, courteous, and kindly Director, M. Regaud. Nevertheless, little by little I began to talk. Nothing was dearer to their hearts than our American slang which, with the unspeakable nerve of the *Américain*, I essayed to translate into correct French. I still remember the effort I made to render a Gallic translation of "Please pass the 'ointment,'" and the frenzied applause of the assembled multitude.

On our last night, I was acclaimed a permanent member of the Bouleuse group. We were all made recipients of a cake with more exterior decorations than Aladdin's palace, and of a speech which contained words running clear back beyond the dictionary to the days of Charlemagne.

Eventually, there was a soirée in the Bessoneau hangar devoted to theatricals. Now it must be remembered that scattered throughout the French Army were the famous artists of the Opéra Comique, the Odéon, and, must I say it, even the Moulin Rouge and the Folies Bergères. Bouleuse had a goodly share of all of them. There was even a printed programme, which carried the following N.B. or postscript:

Selon les circonstances le programme pourra être modifié.

This N.B. was a nicety of French culture; for it would have been quite vulgar to have said, in so many words: "If the Boche avions drop something on this tent to-night, the show is off."

But the gem of the evening was not on the programme. It was an inspiration, entitled "*Ce Sont les Americains,*"

which had taken the form of words and music in the breast of a talented Poilu, who was fired by our clothes and general appearance. Though the French edition is notable, the best part of the song is a translation "into the English" which the author himself worked out with the aid of a dictionary. A fragment of the third stanza is typical:

"Soon after they have disembarked they are on the Front
And they quickly with the Frenchmen in the trenches got
on;
When the Germans saw those new hats, they said, 'Vas iss
das?'
And they all wondered who were those soldiers trim and
square.
Laughing and delighted the French Poilus replied,
And to the astonished foe soon they fiercely cried:

Chorus

"These are the Americans [*Given with a fiercely polite inflection*]

Soldiers of most proud and bold appearance
That come from their far 'way country
Bringing with them Hope and Courage
They'll fight side by side with us,
And to defeat the Germans help us
For they're fellows brave and jolly
And we welcome them with glory.' "

It was a never-to-be-forgotten sight, that Bessoneau hangar crowded with the soft blue uniforms of a thousand French officers and men, most of them with head bandaged, arm in sling, or crutch at side. In the centre were our own olive-drab tunics, and a pathetic group of mutilated men in wheel chairs, watchfully attended by their pretty nurses with white uniform, long veil, and red cross on forehead.

And now and then, above the hum of talk and laughter, the boom and ceaseless growl of guns out there in the darkness, over Reims . . .

The exercises were closed by M. Charles Richet, as straight and alert as a boy, but perhaps well in his seventies. We had known him as one of the foremost savants of France. But that night we knew him as the consummate orator, the man who will never grow old.

Chapter XVIII

I

“**A**ND what do you fellows think you’re going to do over here now?”

Quick as a flash came the reply: “We’re going on to Berlin!”

The question was asked on the dock by a war-worn little Poilu. The answer came from a long lank American, one of the first contingent. And every time I saw that uniform of ours that answer came to my mind. *They* were the fellows who were going on to Berlin. Unconsciously, too, that answer summed up in a few words the spirit of the American Army.

I have taken my time in describing the War on the Western Front as it was conceived, as it was being fought out, from the viewpoint of two of the four outstanding combatants. I shall leave it to someone else to sketch the point of view of the German soldier. But when I come to the American, there can be no orderly plan of exposition. For the American soldier was the born foe of orderly plans —our own, as well as the enemy’s. As a conscientious Sanitary Officer once complained to me, the American, on going into battle, refused to carry boiled water and consented to only one burden: bullets.

The American went to Europe to “get to Berlin,” even if he got there stark naked. That is why he did not go into raptures over a roadside villa when he was told that it was an Evacuation Hospital: for him, a hospital furthered the

speedy evacuation of the wounded in order that it might be ready to move the moment the army moved.

We compromised on this later, out of necessity; but we never once lost that spirit which urged us irresistibly forward and made passive trench warfare intolerable. One can be mighty sure that nothing of real value in winning the War escaped the lynxlike eye of the American, whether it was British, French, or Italian. But our aims were clear; and we were not dragging the chains of traditional procedure, nor those of traditional fear, of traditional hatreds. Thus we would not go to the point of complete immobilization.

We had spent two sessions with the British up in Flanders and two with the French in the Champagne. There remain four more sessions of the School during hostilities, at three of which I was present, and all of which covered our own Front. In many ways the fifth, sixth, and seventh sessions of the School represented its high-water mark in efficiency, both from a scientific standpoint and a practical one; for in them the fruits of this scientific work were applied to war at the crucial moment in the history of the Allied cause.

Our line had been broken in two places. Up near the British, there was the dangerous threat to separate the French and British at Amiens. By the other and more terrible menace, the Fourth French Army had been swept aside; and the Germans had poured through the broken line between Soissons and Reims, to spread like a plague of locusts over the beautiful Champagne valley. It was in the midst of these scenes of gloom that our large group at Langres—where now we lay directly in the path of the German advance—returned to view the smoking remains of all of those fine evacuation hospitals, which we had

viewed but yesterday, as it were, in the fullness of their usefulness.

It was difficult to arrange a tournée of the theatre of operations in the midst of this desperate fighting; but a program was mapped out by which the Staff of the Battle-Training unit should cover by lecture the essential medical elements in our armies and the more purely medical and surgical questions involved, whereafter, in the area now scourged by active operations, would come the visualization of what had been taught.

I covered the following subjects myself in separate lectures: "The Histo-Pathology and Bacteriology of War Wounds," "The Primary, Delayed Primary, and Secondary Sutures," "The Ambulance Company, Its Dressing Station, and the Field Hospital," "The Evacuation Hospital," "Obscure Medical Diseases of War," "Principles and Early Treatment of Bone and Joint Injuries," "Convalescent Camps," "The Duties of a Division and Corps Surgeon," "Chest Surgery," and "Maxillo-Facial Injuries."

My own subjects were typical, but represent only a tithe of those in this course of lectures, which, I believe I may safely say, was the most illuminating and comprehensive course ever offered any group of Medical Officers of our Army, at any time in any war. Among our lecturers were prominent several of our own Buccaneers from Langres, including Colonel Bond, Lieutenant Colonel MacDonald, Major Burnett, Captain Taylor, and finally dear old Porter, who, among other subjects, gave us, from some subterranean and Buccaneer sources, a dissertation on the Austrian and German Medical Services. Said he in conclusion: "If you don't believe it, go over and look at it yourselves!"

Every phase of the operation and treatment of war wounds was taken up, as well as the care of the sick, the shell-shocked, and the gassed. Two entire days were

spent in teaching defence against gas, the treatment of the gassed, and the rapid application of the gas mask. It may seem incredible that such a simple thing as the application of the gas mask should have to be taught to well-educated men—but not when one considers that one or two breaths are enough to put a man *hors de combat* and perhaps bring about his death. Captain Ashcroft, a very forceful red-faced Irishman, who taught this technique, always began his lectures with the phrase: "Gintlemen, in spakin' of gas, there are only two kinds of men, th' quick an' th' dead."

And now appears Colonel Paul Stanley Bond of the Engineers, not only one of our Order of Buccaneers, but a veritable Captain Morgan. Out of his lectures to our officers at Langres came that priceless little textbook for the officer, "Medical Service in Modern War." He begins by saying:

"The Medical Department is one of the important combatant arms of the Service and should be so regarded. It is not alone a shield and restorative, but a mighty offensive weapon second in importance to none of the auxiliary arms.

"It is the function of the Medical Department to keep the fighting man in the battle. He is the Nation's chief reliance, and without him all the other weapons and accessories, guns, tanks, aeroplanes, trucks, ships, are useless. . . . In the Civil War there were in proportion over three times as many deaths from wounds and disease as in the late conflict, although the wounds were generally much less severe. . . . Thus, plainly, the Medical Department is an offensive arm and as such it fights in the very foremost of the battle, in the zone of machine guns and artillery fire. Practical results and not theories are demanded.

"The Surgeon *with the combatant forces* accordingly spends little of his time in hospital buildings. He is in the field, in trenches, shell-holes, dugouts, in camp or bivouac, along muddy roads and in wet woods fighting his fight along with

the other combatants. He commands troops, directs transportation, organizes and controls tactical movements, supervises construction. He takes an active part in all the tactical operations of the combatant forces, accompanies them into battle, and is exposed to rifle and artillery fire, poison gas and bombs from aeroplanes. He is not the swivel-chair consultant or the white-robed, steam-heated surgeon of peace.

"Unless our doctor can adapt himself to these conditions, meet these emergencies, play the game, he is of little use on the field of battle, however skillful in the clinic or the operating room. We can and do use the skillful operators in the rear of the Army, but the combatant surgeon, the man up in front with the fighting troops, must be something more than a surgical operator. He must be an administrator, an organizer, a director, a superintendent, a tactician—in short, a soldier!"

Here was a Buccaneer! It took courage, as it always has, to write the truth.

On purely medical and surgical subjects notable men, selected by me for their national and even international reputation, visited us by invitation from all over the Army and left us their valuable information.

For instance, Colonel Joel Goldthwaite who made orthopedic surgery such a vital thing in this war and the means of speeding up the cars of progress in American war surgery, as well as being the apostle of correct posture, proper use of muscles, and so forth, addressed us on his specialty. His doctrines literally saved thousands of flat-footed men who had been falling out after ridiculously short marches to lie idle in some hospital in the rear for weeks and months.

In all, nearly fifty men lectured to us. When the course was completed, every nook and corner of the subject had been flooded with light, from the treatment of the wounded, gassed, sick, and even the weary, to the complete duties of the Medical Officer, including all arrangements

for first-aid, transportation, hospitalization, and sanitation in every single zone from Front to rear, and a graphic outline of all medical activities of modern war during both trench and open warfare.

2

On June 10, we left for the Gerardmer Sector near Baccarat, all save a group under Major Burnett who went to Toul where the 26th Division was operating. Baccarat was a quiet town in the Vosges in a beautiful rolling country leading to mountainous foothills of the Alps at the border of Alsace. The 42nd Division, whose sector this was, based on three of its regiments, one from Iowa, one from Alabama, one from New York, gradually secured representatives from all of the States of the Union and came to be known as the Rainbow Division. They were hard fighters. This was their first sector, and they were as pleased with it as a boy with his first pair of long pants. They had bestowed tender care on their aid stations, for this was a quiet sector (until they had remained there a short while), and had even gone to the extent of planting turf and flowers at the entrance to their dugouts.

It was noticeable that they had taken especial pains with their protection against gas, for they still remembered an incident in their life which had befallen them when they were with the French. In those days, they had not believed in the terrors of a weapon which they could not hear or see. When they got a gas attack, therefore, they leisurely put on their masks—only to find that four or five hundred of them had to go to hospital some hours later. They also had learned enough to be careful about their feet, to rub them well with whale oil before going to bed at night, because in their march of a hundred kilometres to

the holding position, they had treated themselves and France to a perfectly correct picture of the suffering of the patriot army at Valley Forge, and had gone traipsing around the country leaving bleeding tracks in the snow. So now their trenches were nice and dry and well duck-boarded; and they had settled down to a peaceful time.

But the peaceful quiet of the Gerardmer Sector finally got on their delicate nerves, and, finding that the Germans seemed contented with a few shells near the end of the day, they began to argue among themselves. It so happened that the New York Regiment was formed of elements of the old "Fighting 69th" of Civil War fame. When the Alabamans—who did not like New York City's appropriation of the whole country for itself anyway—were told off to take the first-line trenches alongside of the Iowa Regiment, they referred in what the New Yorkers took to be contemptuous tones to the "Frightened 69th," because the 69th Regiment had been left in reserve. The consequence was that, when it came the turn of the two to serve in the front line side by side, the New Yorkers tossed a few hand grenades into the trenches of their beloved compatriots ("not too near them and just to scare them," they afterwards explained), and a young Civil War broke out.

It was nipped in the bud by a tactful officer, who referred them to the Germans just in time. I can see them now coming in, wreathed in smiles and peppered with fragments of hand grenades, muddy but quite satisfied with themselves. This started the nervous affection to which the good-natured Germans had heretofore been immune. Its chief symptom was sniping with trench mortars and outbursts of rage without any apparent reason.

Colonel Grissinger was the Division Surgeon; and he, like Colonel Reynolds who succeeded him, was one of the outstanding, thoroughly efficient high-ranking officers of the

Medical Department of the Regular Army. He had conceived an ideal ambulance service, which ran like a clock all by itself and was so efficient that it got the wounded clear back to the evacuation hospitals in the incredibly short time of from three to four hours. At the Ambulance Head were the so-called "cab stands," where two companies on duty lay in preparation to replace every ambulance that left a battalion aid post en route to the rear. Colonel Grissinger's system, of course, was good only for periods of inactivity in trench warfare. It will be remembered that in our visit to the terrible sector on the Aisne, we found that it took three hours to get a man from the Battalion Aid Post merely to the Regimental Aid Post—a matter of only two thousand yards or so—which clearly demonstrates why the movement of wounded cannot be fixed like clockwork: it depends entirely on the relative activity of a sector, and on the terrain.

It was in this Gerardmer Sector that we came in contact for the first time with the marvelous efficiency of the German Army in spotting transients moving about in our lines. By some electrical device, eventually understood by our Signal Corps, they absorbed all telephone messages through a system of underground parallel wires; and when a front-line organization called on the reserves for reënforcements, or when one of our Colonels stated that he thought the General ought "to come up and look them over" preparatory to a raid which we were going to bring off, not only did the raiding party find the enemy thoroughly prepared, but also the General who came to look over the ground was annoyed, to say the least, by shells dropping uncomfortably close to him on the way up.

I did not know this, and before any of them could stop me I had telephoned the Division Headquarters that I would be down in about an hour to have lunch. My trip down

was an experience! But, after it was all over, I could see that it was a tribute to have been sniped at by trench mortars. . . .

In the rear, the 42nd had a number of specialized stations. One of them was for the segregation of all cases of the itch and lice. It was rather a pretty station, with picturesque tents around the border of a little lake, but the men shunned it like the Black Death, and it was known far and wide as "Scratchville-by-the-Sea."

Up to this time, the Evacuation Hospitals of the American Army had certainly seemed to us to be very mournful affairs, in contrast with the elaborate grandeur of those we had been visiting up in Flanders and down in the Champagne. And Evacuation Hospital No. 2 here at Baccarat was, like its twin brother, seen later at Sebastopol near Toul, no exception to the rule. At first glance it seemed absolutely immobilized, located as it was in previously existing stone buildings; and in the second place it was huddled in the town without room to expand and with poor road connections. But on closer inspection we soon realized that the American Army had quite the right idea here. Such hospitals should be the very embodiment of mobility. And these were. For all of the equipment could have been moved from these stone buildings in very short order.

And we were just beginning. No practical purpose would have been served, had we gone out in the country and made a tremendous splurge in tentage and suchlike equipment, with say 500 beds, when all we needed at present was a hundred beds in that one little corner of the line, which was virtually part of our training area. Later on, when these divisions went to the Front and got under real battle conditions, there would be plenty of opportunity to use every one of those 500 beds and more. As it happened, however, neither of the above hospitals was ever

called on for such service; and they were kept immobilized because they were needed for these areas which remained quiet holding positions to the end.

Our visit to the 42nd had come to a close. We had seen a quiet trench sector; but everybody, including ourselves, had become fed up with just this sort of thing and longed to get out into the open and prove which was the better man.

I went ahead to take a look at my other group, which I had placed in charge of Burnett, and entered the Toul Sector about the 23rd of June. The Toul Sector was the very antithesis for trench warfare of what I had been viewing at Baccarat. This sector was the nearest to Langres, and it was the most dilapidated, the saddest, the muddiest, and the most forlorn that we saw from the North Sea to the Alps. The reason for this was perfectly clear: it was completely dominated from one end to the other by Mont Sec. There is a cartoon in "Happy Days," the pictorial history of the First Division, which gives the artist's idea of the Toul Sector—a perfectly flat foreground, muddy and wire-entangled, with a Poilu and a Sammy in a shallow shell-hole, completely overshadowed by a pyramidal hill in the near background, behind which is seated a well-uniformed German officer, larger than the hill itself, who is leisurely sizing up his inevitable victims with a pair of enormous field glasses. I dare say there were precious few places in that Toul Sector which could not be well inspected by the enemy. There was no elevation whatsoever, save Mont Sec and its range, and for the establishment of our position we had only an enormous plain twenty miles wide and God knows how many miles deep in mud. The town of Toul had been liberally shelled, and you went into position there counting the very minutes that must pass before they would let you out again.

The wretched 26th Division was born in the mud, the wet, the cold, and the cheerlessness of the Neufchâteau area in the memorable winter of 1917. The most of their billets were in dirty barns, manure everywhere, and no place to go, until they got so dispirited that the complex, psychological and physical, was known amongst them as "mud fever."

Now here they were again, with a front so long as to necessitate a *triage* on the right and one on the left, with a dressing station to each. The officers were overwhelmed by their responsibility toward their men, depressed by their own surroundings, and absorbed in the new problems of the military situation. Battery positions of the Artillery are usually placed, if at all possible, in hilly country. Thus they are well drained, and the men live in fair comfort. But here at Toul one typical camp looked more like the hiding-place of old-time brigands than anything else. The men lived in little caves and dugouts. The ground was trampled into a mire knee-deep, with indescribable ruts and chuckholes. The cook-house was a half-completed wooden building through which the rain poured in streams, so that the cooks had to go about in rubber boots. The mess table, one board wide without seats, was in the open, and the men stood in the mud as they ate. Nearly everybody was suffering from scabies or lice. Delousing was almost impossible.

Bronchissard Farm was typical of the Infantry positions in the swampy part of the Toul line. It was a wide expanse of perfectly flat lands, sparsely dotted with large trees but with abundant underbrush, and completely covered with a thin layer of dirty water. To complete the picture, one should place dirty undershirts on every other bush, add ruined sixty centimeter railways and a few trenches, and then people it with tired, hungry, dirty sol-

diers dragging themselves back and forth from the soggy trenches to the equally uncomfortable dugouts and huts where they slept.

Out in front were the fire-steps leading up over the trench. During the day only outposts lay far in advance of the regular trenches. But at night those fire-steps, where by day men slept, were crowded with armed soldiers. Usually the men sleeping on the fire-steps used merely their ponchos, rolling up in their blankets fully dressed, their rifles beside them. Many men slept in the appalling dug-outs, which were filled with cold yellow water and had to be pumped out at night, only to fill up again knee-deep by morning.

It was apparent that the men made some little effort at preserving sanitary conditions, but the drainage was usually from the shallow side trenches into the main one, and the consequent fouling of the latter cannot be described. One can imagine how difficult it was to carry wounded in those trenches.

Since the 26th Division had been occupying this sector, the Germans had repeatedly made raids on them in force, one of the worst being that at Seicheprey on April 20, in which over 650 casualties passed through the *triage* and 114 were reported missing. The attack was launched in a thick fog, and the fighting was eventually hand-to-hand after a ferocious barrage. Twenty officers and men of the Medical Department were either killed, captured, or wounded, and three ambulances were struck by shells, everyone in them being either killed or wounded. But although subjected to artillery fire in full view on roads, or while concealed in narrow mud-and-water-filled communicating trenches, the wounded were evacuated and dressed. Seicheprey did not fall to the enemy.

On the night of May 9, there was a heavy gas-shell

attack, coinciding with an epidemic of three-day fever. On the 16th of June, 800 attacked Xivray but were repulsed. All of these things I was able to verify personally; and I came away thanking heaven that I did not belong to the 26th Division.

3

The expeditions to the line in the sixth session marked a vast change, for it was at this time that the Americans rebelled against trench warfare and took to fighting in the open.

The first part of the session began, on July 24, with the usual visit to the trenches. When we reached Toul this time, we were blessed with good weather, at least overhead. Although it was very unsafe, I found it necessary to go over again all these weary miles of trenches which the bright sun of to-day had not yet dried of yesterday's mud, and which in places were still knee-deep in water. To have shown one's head would have been as good as suicide, and the men slunk cringingly from one place to another with the air of those who didn't care whether it came or not, and the sooner the better. Toward afternoon it became gray and wet, and the wounded began to increase in numbers.

Continuing to Baccarat, I was overjoyed to find my good friend Colonel Reynolds at the head of things medical in the 77th Division. I spent a delightful time with him going over this sector, which has already been described. But the Gerardmer Sector was getting to be a very uncomfortable place. The shelling had doubled in intensity, and trips to the Front were attended by considerable risk.

Once back at Langres, and mid-way through the session, we were brought face to face with our real situation. We were living in the high tide of events. The Germans were

gathering forces to swoop down upon Paris from their new advance post at Château-Thierry. And Foch had at last interpreted the desire of all *to come out of the trenches and strike in the open*, thus turning the War from this time on into open warfare. He had decided to crumple up the right flank of the German Army by striking first at the neck of the bottle near where they had broken through, using among other divisions the superb American First. Although suffering frightful losses, bordering almost on extermination, they finally had broken through the enemy line; and succeeding divisions had begun to infiltrate. Shortly thereafter, the 26th Division had fallen on the enemy to the right of Château-Thierry and crumpled up that line—preceded, of course, by the stunning blow administered not only by fire but with the very butt of the rifle in Belleau Wood.

This was the situation that had developed since we had left for the peaceful Baccarat Sector; and we almost wept when we saw what we had missed. We need not have done so. . . .

Continuing the session, we made headway with the greatest difficulty up the shell-torn valley on the north bank of the Marne, behind Belleau. The Germans, snapping savagely at every Allied element that came within their reach, were fighting a vigorous rear-guard action in their retreat toward the old Hindenburg line.

At every step our progress became more and more difficult, the stench of dead men and animals more and more intolerable, until we began again to hear the distant thunder of the guns and to see the evidence of recent shelling. After traversing a shell-torn forest, we reached the headquarters of the 32nd Division, which was then in action near Reddy Farm, where they say they very nearly surprised the Crown Prince and his officers, and found an un-

godly lot of champagne and a disordered banquet table suddenly abandoned.

It was an impressive sight, that battlefield of the 32nd. The men were advancing over a field which, but for some slight irregularities, might have been one continuous inclined plain toward Fère-en-Tardenois. This gradual incline ran along for perhaps two kilometers and was about a kilometer wide. The advance was being held up by heavy machine-gun fire from the edge of the woods lining this field. Every now and then someone in the deployed line would keel over, the line would have to close up—and then close up again. Finally, the officer directing the movement said something to a sergeant, which I did not hear. The sergeant called out a platoon and explained to them that they were to silence those machine guns off to their left. The approach to that wood and that machine-gun nest meant certain death for practically everybody in that platoon. And do not imagine for a moment that they did not know it. It was the first time I had ever seen an American outfit hesitate. But it was only momentary. So long as one man might hope to come out alive, everyone in that platoon knew he was going to be that man. And that is the make-up of the American soldier.

When the sergeant saw them falter, he grinned in the most natural way and said: "Come on, you fellows. Do you want to live forever?"

It was ghastly. They went. But it was only the 6th Platoon, following after them, that lived to beat in the brains of those machine-gunners.

We spent the night at a field hospital *triage*. All I can remember, after having followed the advance all day, was a symposium of greasy food in a cloud of flies, with an intolerable stench in my nostrils and the roaring of guns in my ears.

It was interesting to see what an important rôle the Ambulance Company was playing in open warfare, not so much through its ambulances, which were manifestly used to their fullest extent, but through their litter-bearer section. It was obviously unjust to expect a battalion of troops to contribute sixty-four of their strongest and most dependable men for service as stretcher-bearers, thus weakening the firing-line, and cheapening in his own eyes the job of the soldier who had devoted himself to bullets and nothing else. Yet what choice had we? If we didn't get those men back within a short while, they were going to suppurate and be lost to the Division. Here was borne in upon me the absolute necessity of having a Regiment of Medical Department Personnel for this purpose principally. I swore a mighty oath within myself to see to it that the Medical Services, on being incorporated into the fighting machine, should henceforth have a lot of hefty men to depend on, so that they could do their work acceptably.

Thus closed the sixth session of the school. And thus began the era of open warfare, to which the American soldier historically and actually was bound. He knew how to fight in no other way. And when American soldiers were liberated on a battlefield, they reminded me more of a land expedition of good old-fashioned pirates than anything else. Every man was an individual, yet all were bound together by a uniform plan. The only thing that would ever stop them was a bullet in the right place. Fear certainly never did stop them. And an enormous pride surged over me as I looked on that sweaty dirty bunch.

Chapter XIX

I

THE seventh session of the school was avowedly a participation in our great battle—the Argonne-Meuse. For it was our battle. Tactically, of course, a thousand and one objections can be raised. There was too much confusion. Our air force was pitifully weak, and was simply brushed aside by the enemy, whose Taubes impudently swooped down unmolested and shot our men in the back. But whatever can be said in diminishing the importance of American arms in this conflict, none can ever gainsay that the spirit of the Argonne-Meuse was American.

We had been officially ordered to study hospital conditions in the Justice group of evacuation hospitals at Toul. But no sooner had we arrived than I began making plans to distribute our Medical Officers over the American Front. Every one of those groups subsequently had its rich tale of experience to tell. I can only speak of my own. My first carried me over on the extreme right of our line to the camp of my old friends, the 26th Division, whose commanding General was a dear personal friend.

General Edwards was one of the most picturesque and efficient of our Division Commanders. He was very much in a quandary when, on being asked for my orders, I replied: "I have none. This is the biggest fight we're ever going to be in, and I'd rather have my hide punched chock-full of holes than miss the action. I came here because I

knew I had a friend in you upon whom I could depend not to send me away. And what is more—”

But he stopped me here. “Well, Bailey Ashford, you probably lost your order. You can explain that later. I have no time to listen to that now. Go on with your old friend Porter and do between you what you damn please.”

“Now,” I said to Porter, “I’m like everybody else. I’m fed up on trenches and camouflage, and I’ve finally got the fever. I want to see this fight.”

That night was spent in getting everything set before four-thirty a.m. when our troops were to attack, with orders to take the towns of Marcheville and Riaville, hold them until nightfall, and retire before daylight. The attack, of course, was a feint on Metz, and was intended to draw as much as possible of the German Army down in the wrong direction. One of our officers had got himself captured, quite conveniently, with his pockets bursting with fake plans and orders.

The attack was a brave one and met with the most determined resistance. They went over the top at four-thirty a.m., and, although they anticipated getting their objective by surprise in an hour or two at most, they were still fighting their way, halfway across, at eight a.m. After desperate struggling, they took both towns and held on till night. But getting away was worse than going over. The Germans had laid down a tremendous barrage and had filtered in behind them, and they had literally to cut their way through to get back at all. Every inch was disputed. After watching until late in the morning their struggles to evacuate the wounded, I rushed off to get into the main attack, striking Souilly towards dark.

Here the Medical Services had concentrated, and here to my great delight I found General Ireland, his intimate friend, General Kean, and a whole group of officers whom

I had known well in peaceful days around Washington. And all this time the wounded kept rolling in. They filled the hospitals, and then they began to spread all over the place and had to be rapidly examined by the light of lanterns, in order to pick out the worst cases for immediate operation.

I have always been astounded at the lack of ability of otherwise sensible people, who were not privileged to see their country as it really was in its moment of trial, to visualize that wounded man. For some strange reason they smear blood all over everything; they want to have a man lying on a stretcher soaked with blood, arteries spouting like a fountain and the ground avidly absorbing the life-giving torrent. They want to see men picked up with an arm or a leg dangling from a thin ribbon of skin, the only thing that holds it to the body. They want to see a stretcher laid down every few minutes to pick up a handful of intestines that will slip out in spite of bandages. They want to see the contortions and hear the groans of agony.

Now, as a matter of fact, what one usually saw was a man limping in with nothing visible the matter with him, or with a bandage around his head; or a man contentedly puffing a cigarette on a stretcher with a wire splint sticking out from the bottom of it. Now and then you did see a motionless bundle under an army blanket, pale and cold. Now and then, also, you saw a man spitting blood and breathing with difficulty. And now and then you came across a very vociferous individual, bawling for help or screaming that he was in pain. On examination, nine such cases out of ten would have nothing very notable the matter with them. In fact, the noisier a man was, as a rule, the less severely hurt was he.

When we stop to think of what has happened since that man was hit and the time that has elapsed, we realize im-

mediately that he couldn't hold enough blood in his body to besmear everything around him all the way in, throughout six hours of carrying. He was generally pretty bloody when you picked him up, and bloodier still by the time he got to the First Aid Post, but there, as a rule, his bleeding was stopped by good bandaging, and gave no more special trouble. He was heated wherever and whenever he could be heated, so that by the time he reached the scene of his operation or final dressing, as the case might be, very little blood was visible, and that came away when the dressing was removed.

As a matter of fact, many of our severely wounded were men "spattered" by fragments of exploding shell or hand grenade. Only too often it was most difficult, even after careful search, to find the wound of entrance. This was especially so of the most serious type of wounds we had: abdominal wounds. Imagine a tiny, even insignificant, black, bruise-like slit in the skin of the flank: open the abdomen; all the organs are swimming in blood, from an artery in the richly supplied fanlike membrane in which, as in a hammock, swings the intestinal canal. Imagine finding, after you have mopped up all of this confusing liquid, the intestines perforated in twenty or thirty places—the bladder opened and the urine streaming into the peritoneal cavity—perhaps the spleen or liver burst from the intense explosive effect. I know of no greater surprise for the layman than to show him for the first time the ruin lying behind some tiny discoloured slit in the abdominal wall.

Outraged nature claimed its own about four a.m., and I turned in.

The next day I made an excursion all by myself up through the centre of our advance in the wake of the 35th Division. Here I found my friend Turck, the Division Surgeon, both leggings off, no hat, shirt ripped wide open,

shoes unlaced, his hands clutching his head. He was in a road jam. They had blown up a section of the road ahead of him, and everything had been stopped. He couldn't get his ambulances forward, and there he was, his division fighting like mad ahead of him, runners bringing news of a terrific casualty list, and no wounded coming in. It seems that the interruption to traffic had been complete. Enemy shells were tearing over our heads and exploding in the woods around us, but, with the exception of men wounded in our immediate vicinity, the block had effectively stopped evacuation.

I suggested that stretcher-bearers be ordered to carry back to the point where the road had been blown up, and that the wounded be there transferred to the ambulances. The Division was going on, however, and that carry was getting more and more impossible with every kilometre of the advance. Moreover, in the scramble of our men to get ahead, enemy machine guns had been allowed to filter back through the woods on either side and were now turning the road into a little hell of their own, while the column stood unable to move forward.

To make matters worse, there was a dense fog in the early morning of September 26th, and, although the strong positions of Vauquois Hill, Bois de Rossignol, Côte 221, and other points of resistance had been taken, as the fog lifted the enemy fire became more and more effective. The attack slowed down to a temporary halt before the strong enemy positions at Varennes on the left and Cheppy on the right. Terrific loss was suffered at both these places—particularly at Cheppy, where there were heaps of wounded awaiting ambulance transportation.

Tanks were brought up, and, after an obstinate fight, both positions were captured. Classical aid stations were

not possible, and even splints had to be improvised. At Cheppy alone, a strong point in the Hindenburg line, seventy-six machine-gun nests were taken.

In the conference at the *triage* of Neuilly, where I had first met Turck, we were joined by Grissinger, now Corps Surgeon, and after a monumental struggle the block in the road was cleared. This was a battle in which all movement of the wounded had been stopped; and only after the most devoted and dangerous ambulance service was it possible to clear the battlefields. I spent the night, as I had the night before, in operating upon the most desperate cases.

From that time on the rout of the German Army was complete.

My last recollection of the Front is of seeing a long line of disarmed Germans. They had evidently had a good meal for the first time in a long while. They were singing as they marched. Their guards were taken from the 91st (coloured) Division, which was consistently referred to by the soldiers, in continuation of the poetical sobriquet bestowed on the 42nd, as the *Midnight Division*. One of the most amusing things that I saw in all France was battalion after battalion of these captured Germans, each with a lone negro guard. I heard one of them say, after turning around and looking fiercely at his charges:

"Come along, you white folks, and move lively there. They's a good dinner at the end of this here march."

But one thing, a very personal thing, claimed almost my entire attention. It was inspiring, then, for me to look into the face of my own Chief, as I parted from him and bade him good-by; glorious to realize that that man was representing, in the hour of victory for our arms, a victory for our Corps and the profession it represents. Honest, brave, with a keen sense of humour and with just enough wrath

to make him perfectly delightful, General Ireland was the embodiment of everything that has made me love the Army of the United States.

2

It was hard work going back to Langres. I had been told of what was going to happen to me. They knew nothing of my orders, but they had got it into their heads long before this, quite on their own, these Buccaneers, that they would have a series of farewell banquets, so that they wouldn't have heart-rending formalities thrust upon them too suddenly. We all knew now that it was only a question of time before we were going home. Armistice was being freely talked of in the streets. And the banquet in my honor happened to be the first of the series.

And now as I look back upon my experiences in the Great War, I unconsciously see first a little upper room on the corner of a narrow street in a town of the Middle Ages—that dining-room around whose board we seven friends gathered day after day to sit in intimate conversation long after the table had been cleared, long after Mme. Bailly had washed the dishes and dried them and put them away in her immaculate kitchen in the castle just across the tiny court. That room held seven people comfortably, but not over three more. It was homelike, clean, well-lighted. The long windows with their muslin curtains, the open fireplace, the old clock—that was all, and yet it was home for me.

I did not realize when I left the United States with all those uniformed men that I was going to live another life. It was brief—all too brief—and I look back on it as if it were not a part of this life of mine at all, this scrabbling about in the jungle of America, the jungle of ideas, the search for microscopic ideas, for the needle in the haystack,

the eternal sifting of the commonplace—oh, how commonplace!—in order to emerge at some high point that will give me a view, a comprehensive view, of a new or undiscovered America. And now here I was, living *my* life with *my* ideas in the company of men like myself who were living perhaps for the first time in *their* lives.

We had only to go to the window, lean out, and take a silent part in the life of the town itself, for everyone stopped at this corner to exchange a few words. Up the street was the cathedral park; beyond, the huge church itself, the seat of the ancient diocese, which took a very real part in the life of this people. Down the street in the opposite direction was the rampart that overlooked, above the tops of stately trees that lined the road winding up into the town, the billowy plain of orchards, grain fields, and forests that used to delight the eyes of the wealthy feudal lords who ruled Langres and had a voice in the Government of France. Crossing the street was another that led winding into the center of the town, lined by tiny shops, ending at the tavern on the plaza.

But after all that room appealed to me not because it was French, nor because it held this particular group of us, but because it was *home*. It bespoke by its hospitable fireplace, when we gathered shivering around it after stamping off the crunching snow from our boots outside, the home of a race that loved a home, that loved the bells of Christmastide, the chat by the firelight, and the warm glass of after-dinner port. So it was with a wrench that I gathered round the table with the Buccaneers for the last time, they unconscious of the impending break in the round-table.

After a monstrous dinner, of which I must confess I did not have the appetite to take my rightful part, there came upon the table the *pièce de résistance*, a huge cake with a frosting to which every pastry cook in Langres (I knew

them all) had contributed, according to Mme. Bailly. It was surmounted by crossed French and American flags. I essayed to speak, but the words would not out. I could only think to myself: to-morrow I start on a long trip, to end eventually in my laboratory and my work. I had been made Chief Surgeon of the Sixth Army Corps at Liverdun, said to be the nucleus of our Third Army. There was a long silence, deathlike, never-ending. . . . Then Bond arose and slipped out without saying a word, and after him the rest, one after another, until I was left alone in my "home," and I, too, had finally to rise and go.

They were all up bright and early to see me off—Mme. Bailly in tears, the old Canon in the doorway to wave his hand.

We had been travelling along in silence for about eight hours, but for monosyllables, myself and my chauffeur-sergeant, when we were stopped by a negro sentry at a bridge. The sergeant, after showing his orders, asked:

"Which is the road to Liverdun?"

"Liver which, boss?" replied the sentry.

"Liver-done, you black ape!"

"I ain't heard of no sech place as that Liver— What you call it, sergeant?"

But we finally found it.

Liverdun! It was night when we reached it—a huge castle in the depths of a forest, remote, uncanny. All the remoter now, for I preserve of it only a shadowy sketch—its great entrance hall and imposing reception salon with armoured effigies of some old knightly family, waxed floor, a grand piano. And distantly, very distantly, the low familiar rumble of the cannonade.

"*Voici, M'sieur! Un bleu!*"

I hastily opened it:

Colonel Bailey K. Ashford is hereby relieved as Chief Surgeon of the Sixth Army Corps and ordered to proceed immediately to Brest to embark for the United States there to report for duty as Member of the General Staff at Washington, D. C. By order of the Commanding General, — — —, Chief of Staff.

3

With a few exceptions, I have refrained from mentioning any of our experiences, professional or otherwise, in Paris on our various expeditions to and from the Front. To arrive at Paris from the Front was always a stirring experience. The city represented something for which we were fighting, something very real and tangible. Paris is a delightful city in a sense not perhaps realized by those who know it only in affluence. When I came to know it most intimately, it was homelike, lovable, and its beautiful things beamed cheerfully upon us through the gloom and gray of war.

The theatres were kept up, and, above all, the supper houses, of which none is more distinguished in memory than the Restaurant Lucas at the foot of the Madeleine, where excellent food could always be found, as well as excellent company. Indeed, there was never a gray day in Paris for me. When I was anxious to hear some good music, it was Père Lucas who directed me. Besides being an excellent chef, he was an enthusiastic musician. "Go," he said, "over the bridge leading to the Chambre des Députés, and in the little street alongside of it is an unpretentious-looking building. Drop in there and listen. No one will put you out."

I went there one Sunday afternoon and listened. There, at the portal to the Montmartre, I discovered, was the meeting-place of the budding musicians of the world.

They had no fixed programme; but they had organized a symphony orchestra of their own, and there they played at will the most charming, the gayest, and, at times, the most touching of the music that delights the French heart.

And Paris in its medical aspect: it was really inspiring to sit, as I have sat for hours, in the Lycée Buffon, listening to that charming old white-haired man, a veritable god among neurologists, Professor Babinski, who once sat me beside him and showed me the intricacies of diagnosis in shell-shock and certain queer functional disturbances of the nervous system. There also I watched the famous Chutro, the Argentine surgeon, do his dressings and explain his treatment of those horrible suppurating cases from bone destruction that finally drifted down to Paris from the Front.

One day I wandered over to the Institut Pasteur. It was after hours. I could find but one person who would take any interest in me at all: a frail old gentleman, whom I did not know, but who asked me in a very kindly way if he could be of service to me.

And I said: "Yes. I have come from America, but more immediately from our Front in the Haute Marne, and I have come here with the desire to see the tomb of Pasteur."

He smiled and disappeared, to come back with an enormous key and unlock a door that looked as if it led to some storeroom. He threw both doors open, and, as if by magic, I looked into a veritable garden of brilliant colour. The walls were covered with pastoral murals; there cattle grazed on those swelling plains, or, as the French say, *prairies*, which I had left behind me in Domrémy; there were rabbits, trees, guinea-pigs, horses, even insects, and, above all, flowers, all in rich colour, all gay and bright and cheerful with light filtering through amber glass that made it like sunlight. And there under an arch lay the tomb of the

great Pasteur, and over the arch these words in golden letters:

“Happy he who carries within a God, an ideal of beauty, he who obeys an ideal of art, of Science, of Fatherland, of the virtues of the Christ.”

These words burned themselves in upon me and made me grateful to the people who had known how to inspire, in those who follow our profession, a religion as deep and fine as any which human imagination is capable of creating.

My guide asked me from whence I had come, and I told him a little more about myself: what I had been studying for many years in Puerto Rico; what I had seen there. To my great surprise, he told me that he knew my name. So I asked him: “And what might your name be?”

And he replied simply: “Emile Roux.”

It was the Director himself who had shown me the tomb of Pasteur: the man who had first conceived and used the serum against diphtheria; student and follower of the great master himself, Roux, revered by every physician in this world of Medical Science.

He asked me to come and lecture on sprue at the Institut, and I promised to try to do so, but, owing to conditions at the Front, I was never able to keep my promise.

I did not start to write an essay on Paris, but merely to say, in closing this simple reference to my pilgrimages to the city of light, that, even in the darkest days of the War, Paris never ceased to shine for the artist, for the music lover, for the scientist. Nor did she ever for one moment fail the struggling soldier out there in the mud.

PART FIVE
NO TRUCE IN THE TROPICS

Chapter XX

I

THE shock of returning to my native land was so great that it left me at a loss to know how I would ever accommodate myself again to the mental climate. There was a naïve superficiality about Washington which, while it amused me, oppressed me frightfully. I called it indifference, the quality Washington had. And the reason for it, I knew, was the simplest one in the world: the traditions of Washington were those of any country village which had not been in touch with the moving, emotional appeal of great events. In those days, Paris was the heart of France, the objective of War's spearhead. Washington remained the accounting office of a great business—the business of administering the United States. Interest there was limited to this concrete duty. In that atmosphere, ventures into the realm of speculative thought were so much aimless wandering.

But there were compensations, of course, and one of them was the weekly salon in true French style of Dr. Alexander Graham Bell, who lived in a beautiful home on Connecticut Avenue. He surrounded himself with scientists of all kinds and stripes, travellers, littérateurs, and historians. Everyone who went there was expected to give a lucid talk for five minutes on something of interest pertaining to his specialty. However, it was more the psychologic study of the group than what they had to say which made those evenings delightful.

There in Washington sat the General Staff, when it sat. And now the Armistice was signed. Strange to say, I cannot for the life of me remember one single deep hearty note to make that day prominent in my memory. Congress was in session at the time. The Military Committee of the House was hurrying the Army War College to prepare a scheme of army reorganization in accord with lessons of the Great War. We were in a state of confusion and overwork; and small wonder; for one day we were called upon to provide the auxiliary units to equip and supply a million men, the next day to go back to the skeleton army of seventy-five to a hundred thousand. Many the night I struggled until dawn, to complete a standard supply table and at the same time preserve the essential findings which had rendered the old standardization obsolete.

The city was a seething mass of war clerks, employed in multitudinous ways by the Government for the supply and general direction of the War. But Washington has always had a certain casualness, a certain self-satisfied attitude which makes enthusiasm the rarest of phenomena. After the Armistice, the spirit of the commonplace laid its palsying hand on high endeavour, and made what the Reverend Hamlin was going to preach about in the Church of the Covenant on Sunday of much more importance than the personnel of our standing Army.

The impressive day dawned in Washington, however; the day of the unveiling of the memorial to the First Division. The monument was raised in the rear of the War Department—and was paid for by the Division, which had just returned, and was composed of Regular Army troops. I shall never forget the feeling of intense satisfaction with which I rode up Pennsylvania Avenue, on the staff of the Commanding General at the head of this

Division. But the solemn dignity of the spectacle was quite ruined by white muslin posters tacked on light frames and carried by each organization, to state what they were, the battles they had taken part in, and the number of killed and wounded. The information was vital; but it should have been eagerly sought in the daily papers, not carried as in an artisans' parade, or at a political rally.

Here was the celebration of a great feat of American arms. Of the 28,000 marching men, only 1,500 had sailed for France with the original First Division. The rest, dead in the battlefields or lying wounded in hospitals throughout the country, were visible only in ghostly memory to those who had seen that Division steam out into the unknown in June, 1917. But Washington is used to parades. With honourable exceptions here and there, Pennsylvania Avenue was lined that day with indifferent people of small intentions, temporarily protected by little jobs. The marching troops caught no inspiration from those all-too-practical young women clerks and bureaucratic males, who wondered, shifting their gun from side to side, how long traffic would be interrupted.

2

Little by little, my secondary task as Editor-in-Chief of the Medical History of the War pushed my other duties aside. I had done my bit. I saw opening before me a life of almost interminable data-collecting, when in reality I was impatient to complete my work on sprue, and to convert the Institute of Tropical Medicine of Puerto Rico into something permanent and worth while. Finally, I went to my General and frankly told him of my ambitions; that my life was cast for tropical service; and that every human interest in my profession was silently beckoning me home to the breeze-swept tropical Islands of America,

where were my colleagues and friends whom I had not seen since the beginning of the War.

I was promptly relieved; and I returned to Puerto Rico with my wife and family, who in the meantime had joined me in Washington. But immediately on reaching the Island, I was handed a cablegram ordering me back to Washington by the return trip of the same vessel.

When I reported to the Surgeon-General, I learned that the State Department wished to send me on a semi-diplomatic mission to Cuba. So I saw the Assistant Secretary, who told me that certain Americans in Havana had complained that Cuban sanitary officers had relaxed their vigilance. Some mysterious fever had appeared in the heart of the city, coincident with a great increase in mosquitoes; and the American residents were asking for an investigation. The implication was that yellow fever had been allowed to break out again.

I reported some days later to our American Minister in Havana, and he gave me a list of people to whom I should talk. The first person I called on was the Director of Health, Dr. Juan Guiteras, formerly a professor in one of our big medical schools in Philadelphia, a man of middle age with an extraordinary experience, both as a pathologist and a clinician.

Guiteras, whom I knew very well, was one of the two greatest world-authorities on yellow fever. I found him much offended that the State Department had paid any attention to discontented Americans who, according to him, were simply trying to stir up trouble and provoke intervention. He reproached me because I had lent myself to such a hypocritical subterfuge for acquiring control of Cuba's rich fields of sugar and tobacco.

I made him understand that an officer of our Army is in duty bound to put his personal feelings to one side and

obey orders in the spirit in which they are given. Said I: "It seems impossible, in spite of the intimacy which has existed between us, that you should think I would lend myself to any low scheme to hurt Cuba and my own country too. You ought to be glad that it is I who am called to report the facts, and not someone who has no conception of the Latin American."

Thereafter "the sun shone with the spirit of the *hidalgo*." Guiteras buried all his misgivings, and coöperated with me in perfect harmony.

The story pieced together from the facts I unearthed was a simple one: Prosperity had reached the fantastic. Sugar was selling at dizzy prices and everyone was planting. In the Oriente the wealthy Spanish Colony, often backed by American money, found themselves so short of labourers that they had to bring in Haitians, Jamaicans, and Puerto Ricans from Ponce. There was no doubt that many of these immigrants were infected with malaria. The Spanish colonies, which had sumptuous hospitals in Havana for the exclusive use of their own people and their employees, sent in all of these cases to be treated.

Now these hospitals, isolated in the heart of the city in magnificent parks, were under the constant vigilance of the Department of Health, and were staffed by a large number of high-salaried pathologists, parasitologists, proto-zoologists, and other clinical laboratory men. Nor were these centres lacking in any detail of equipment for the epidemiological treatment of the disease. All nearby breeding places for mosquitoes were suppressed, or, as in the case of fountains and small ponds, oiled; all windows and doors were screened, the latter double-screened, and so forth.

But the staffs of these hospitals were practising medicine, not sanitation. As soon as the patients sent in with malaria

from the Oriente were freed of their fever, they were encouraged to take the air and sunshine of an afternoon as a measure of hygiene and recuperation. It was altogether natural that those who wished to stay out in the parks for a longer time could do so, and that the evenings should be spent in group conversation, so dear to sons and daughters of the tropics. I do not suppose that, in the short period of time before they were thus allowed to roam the parks, the circulating blood of five per cent of them had been sterilized. Therefore, only the right kind of mosquito was needed to spread infection from these cases, apparently cured, to people living in the environs.

Let us now try to visualize what had happened to the mosquito population of Havana in those prosperous days. The money pouring into the capital from Cuba's rich fields was being used, in part, to beautify the city and improve its streets and avenues. There was an era of feverish building. All of this called for the digging of ditches, of foundations for buildings, and so on, in which water could collect. And in just such collections of water near domestic buildings the anopheles mosquitoes breed by preference. Hence was furnished in abundance the vehicle by which infection spread from the carrier of the organism to the healthy. Furthermore, the Health Department's appropriation for the buying of oil and the hiring of extra employees to apply it to these innumerable breeding-places was totally insufficient. And thus was closed the circle of events which had led to a tremendous epidemic of dengue fever, another disease carried by mosquitoes, in addition to the malaria brought in from the Oriente.

Under the circumstances, there was no trouble in securing emergency funds; and from that time on all reasonable cause for alarm was removed.

There was nothing very remarkable about the successful

outcome of my mission. I had simply gone back to first principles, which were well known to all of those clinicians, but which they had overlooked.

It was at this time that I met Mme. Rosalia Abreu, a beautiful eccentric, fabulously rich, who owned a whole *barrio* of Havana called the Palatinato. She had been talking with one of my Cuban sprue-patients. She very correctly diagnosed her own case, and requested her doctor to bring me out to see her. The Palatinato was one enormous park. After a drive of something like a kilometre from the trolley station, one reached a handsome château in the style of Louis XIV.

Mme. Abreu was a charming woman, a marvellous linguist, and a devout Catholic. Her parlour—not, however, the most interesting of the rooms of this castle—was adorned with bric-à-brac and furniture collected with great taste in her many visits to France. But it was her dining-room that completely captivated me. At the far end was a set of Venetian glass windows, representing the frondose canals of that city; and the walls were decorated with murals, illustrating the life of this remarkable and beautiful woman from her youth to ripe middle age.

The doctor, who evidently knew her very well, excused himself and left me alone with her, and there followed the most bizarre conversation I have ever had. She had no hesitation in telling me that she believed that apes were far more dependable and better company than men; and she remarked:

“None of my family ever visits me, because they’re all afraid of my monkeys. To tell the truth,” she went on, “my doctors also are afraid to come here, because I can’t keep the poor monkeys chained up all the time, and always let them out about four in the afternoon. I have considerable trouble, though, with my keepers. Only the other

day one of my gorillas was insulted by his keeper, who didn't understand him as I do. He attempted to teach the man a little lesson by chewing off the end of his finger, whereat the idiot shot the poor beast and killed him. I would have killed the keeper if I had been there!"

And I believe she would.

Thereafter I was a rather constant visitor at Madame Abreu's house, for her sprue was real, and I had finally induced her to make the necessary dietetic sacrifices. But she had considerably more faith in the vaccines. I tried to explain to her that the vaccine treatment of sprue was in its infancy, that as yet I had no sufficient proof that it was of special efficacy, but she insisted, until I had to give it to her. And, as a matter of fact, whether by coincidence or suggestion, or because of innate favourable immunologic qualities, she became rapidly better.

One afternoon, toward dusk, we were sitting in the handsome dining-room, awaiting dinner. I was watching the lengthening shadows thrown on the long road shaded by noble trees, and was wondering how much of truth and how much of fiction there was in the undoubtedly disordered mind of my hostess, who this time was conversing with me in French, when into the room, like two bad boys, burst a pair of monstrous and forbidding apes.

I had been asked to dine with Mme. Abreu and her two favourite companions!

This was too much; and I kindly but firmly told her that I would not remain so long as they sat at the table. She was very nice about it, for this happened to be one of her lucid moments. She remarked sweetly that it was too bad I didn't know how to appreciate them; but that, since I was her good friend, she would send them out and not take offence.

We sat down again, and I have seldom enjoyed a more

sprightly companion. She knew all the gossip and all the secret tragedies of the Cuban and the French Republics. As the topic might suggest, she would spring from English, which she spoke perfectly, to French, and then to Spanish, without the slightest effort. But above her modulated voice I heard the howls and growls of the favourite gorillas, as they were taken with clanking chains up the spiral stairway of marble, to be locked up there, next to her bedroom, for the night.

3

When I left for the Front, I placed one set of my precious *Monilia* cultures in the hands of a laboratory technician, and another in the Army Medical School at Washington. Now, to my great grief, I found that both sets had been allowed to dry up. I was not able to save over half of those cultures, patiently accumulated through the years. Some of them were new species and very beautiful. I remember one creamy yeast, of a deep rich purple colour, which I have never been able to find again.

Up to this time I had published eight articles on sprue, its treatment, and its causes. In the spring of 1917, I came out flatly and claimed that I had found the cause of tropical sprue in a *Monilia* which I called *Monilia psilosis*. My happiness then was complete. But when I returned to my little Island and to my laboratory, I found that the scientific world was not very docile in adopting my point of view.

A thousand objections had been found to my conclusions, to my methods, and even to the identity of my new-found organism. The piling up of evidence to show that this organism was present in an overwhelming percentage of cases of sprue served only, it seemed, to stiffen the resistance against accepting my viewpoint.

Probably the most obstinate opposition has come from

the London School of Tropical Medicine—a centre for which I have always had great respect, and in which my confidence still rests; for I am persuaded that the day they concentrate on this phase of the problem, they must see the connection between the yeast organism and sprue. In my own country opinions were divided. There were experimenters who seemed to confirm at all points my conception that sprue was a moniliaisis of the intestinal canal; but there were others who came to exactly the opposite conclusion.

Among those, however, who did confirm my results was a lone German, Dold, working in China, whose animal experiments seemed conclusive. And from that day to this the merry war goes on. But, while the *cause* may be said to be still *sub judice*, progress in my clinical conception and treatment of the disease was rapid and sure.

And now, through clinical medicine, I myself came to some very important conclusions. *Monilia psilosisis* was not the *only* causative factor of sprue. In addition, a nutritional unbalance due to eating an excess of fats, starches, and sugars played an important rôle—how important no one yet knew. And a great insufficiency of meat and other foods of animal origin was another important, not to say indispensable, factor. A correction of dietary insufficiencies usually *cured* the patient of sprue. Of this there seems to be no doubt.

Among the ills suffered by dwellers in the tropics, a prominent one is derived from an overweening desire on the part of our northern brothers to give us advice as to how we should live; advice derived not from experience but from pure theorizing. One of the most colossal mistakes ever made in the medical lore of our great scientific centers in the North has been the insistence on a substantial reduction in the amount of nitrogenous foods, as typified

by *meat* and other substances of animal origin, to be included in tropical diet. This doctrine was based mainly on the theoretical objection that for a hot country meat threw too much strain on the organs of elimination, especially the kidney, and that it favoured the development not only of Bright's Disease, but of all of those affections, such as rheumatism, which are supposed to arise from the accumulation of unexcreted waste. To this pernicious doctrine alone can be attributed much of the distortion of a diet normal for tropics, not to mention all of its baneful influences and disastrous consequences in preventing the normal nutrition of the individual.

In the first place, the premises for this theory are false. The kidney of the inhabitant in the tropics gives no evidence of being subjected to undue strain, even among heavy meat-eaters. It is really true that Bright's Disease is not a common affection in the tropics. In the second place, those vital organs which have most need of the repair parts necessary for rebuilding are more rapidly used up, because such organs under tropical conditions bear a greater strain than in the North; and it is in the foods of animal origin that we find the material of which they are composed.

And then came another tremendous discovery: the pernicious anæmias of Puerto Rico were nothing but the closing scene in the clinical picture of tropical sprue. They were not pernicious anæmia at all. They were anæmias of a pernicious type, almost—but not quite—indistinguishable from the dreaded affection of the North.

And now comes on the scene liver extract, that marvellous concept foreshadowed for many years, strangely enough, by early clinicians in the treatment of sprue in the Orient. With this weapon in hand, and with the diet, and possibly, yes, with the injection of my *Monilia* vaccines, sprue could be said at last to be a curable disease.

The participation of *Monilia* in the causation of sprue is still a mooted point. To-day, I myself have modified my wild enthusiasm of 1913. After a year's painful and painstaking study of a large number of Castellani's species, as well as my own, involving the daily inspection of 360 culture tubes, the noting of changes, the making of *camera lucida* drawings, and the taking of measurements, I have come to the definite conclusion that my organism is not a new one, nor are his; that these fermentation phenomena in the various sugars can never serve to create new species, for the simple reason that the same organism in the presence of one sugar to-day will ferment with gas and on the next day fail to ferment. This tremendously important observation, made only after such a long and exhaustive experiment, has brought me to definite beliefs:

That the *Monilia* so imperfectly described in 1853 by Robin as the cause of thrush in children and worn-out old people is the same *Monilia* now clearly differentiated that we find in sprue; that the thrush of infants and old people is merely the singling out of a sore mouth occurring in the course of a general infection of the intestinal tract by this *Monilia*; that thrush found in northern countries is only encountered in children weakened by digestive disturbances and in the aged whose resistance has fallen low; that sprue is the same disease exaggerated in tropical residents weakened by digestive disturbances caused by nutritional unbalance and nutritional deficiencies; that the basic nutritional conditions are converted into what we recognize as tropical sprue, a very clearly defined disease of the tropics, by the overgrowth in the intestinal tract of a fungus indistinguishable from that fungus known in the North as *Monilia albicans*, and causing thrush; and finally that the cure and prevention of tropical sprue is basically dietetic, with the addition of liver extract when the anemia be-

comes pernicious in type, and with the use of my *Monilia* vaccine when the faith and enthusiasm of the physician will lead him to apply what is still a theory to the treatment of disease.

In other words, the scientific question is by no means settled, whatever my own opinion may be. But one thing is finally settled, the thing that, after all, counts: sprue, the scourge of the upper classes and of the foreign residents of Puerto Rico, was first definitely recognized here by myself in 1908; and to-day, thanks to persistent clinical work, both here and in the past of tropical medicine in the Orient, sprue is an entirely curable and preventable disease. When to this is added the still greater flood of light thrown on disease processes of Puerto Rico by a correction of nutritional defects, we can fairly call it a day's work.

Whatever be the microbic or parasitic cause of the diseases of Puerto Rico, it is very certain that their seriousness is largely dependent on the terrain in which these organisms are sown. Diseases have a personality of their own, and they depend to a large extent for their expression upon their environment. So in these slow-going diseases of an infectious, or probably infectious, nature in Puerto Rico, the terrain, i.e., the condition of the patient as to vitality and resistance, is a more important factor than those organisms which we once supposed were capable of invading and destroying their victim single-handed.

Be that as it may, from the beginning of my work I saw the value of numbers in making an accurate estimate of what happened typically in the development and course of a disease of this sort; and so every case of sprue that fell into my hands was meticulously studied according to a uniform plan for the accumulation of circumstantial and other evidence. I put myself in the proper attitude for trying to judge the case on what actually happened, on what I had

found. I was certainly not trying to prove that the organism which I had described as the cause of sprue was really the only factor in its causation. In fact, I was perfectly willing to cast it off and frankly acknowledge that it was not the cause of sprue; for decidedly, next to discovering the cause of a disease, the finest thing in the world is to acknowledge frankly with reasons adduced that one was wrong in one's first conception. This is science.

I suppose that I have seen from two to three hundred cases of tropical sprue every year for twenty-five years. When I reached an accumulation of some four thousand cases, all cases of my own, all cases followed and treated by me—and almost all of them cured, through the docility of my patients in following the simple plan of treatment, especially from the dietetic side—then I began to see that it was time to stop the mere repetition of case histories. I could stop mounting up data to show what percentage did and what percentage did not carry *Monilia*, and could begin to focus scientifically on heretofore unstudied phases of the disease.

The first great question was: How many of these cases that I had been calling sprue were really cases of sprue? Could not some of them be simply the expression of a nutritional unbalance? And this led me into what I believe to be the most important of all of my scientific speculations so far undertaken.

Yes, there were some cases—not too many, thank heaven, perhaps five hundred—that were not sprue. They were on their way to sprue, but the picture I had interpreted as *disease* was in reality only a *condition* brought about by a disordered physiology. People who ate excessive quantities of foods destined only to be burned up as fuel for the machine, and who secured an insufficient amount of those fragments of protein necessary to build into the tiny

elements that replace worn-out vital organs, were people who soon showed their organic deficiencies in function. Indigestion came about; there was loss in weight; and there followed an excessively acid reaction inimical to health and irritating to the mucous membranes. Hence the sore tongue, the sore rectum, the burning in the pit of the stomach. These evidences were not due solely, as I had first supposed, to the inflammation caused by *Monilia* growing upon those mucous membranes. And so on, almost *ad infinitum*, until we could say that sprue was essentially a wasting disease.

A careful distinction was now attempted between this disordered nutrition and true sprue. And while we are still clinically uncertain where to draw the line, one thing seems very evident: even in the North, where sprue does not exist, similar nutritional defects must frequently, and do frequently, occur; yet that disease, with its striking personality, does not exist there. Such cases of exaggerated nutritional unbalance are designated "non-tropical sprue."

If, however, this *Monilia* enters gradually or suddenly into the picture, we have true sprue. Hence I have come definitely to believe that the great underlying basic condition for sprue is this nutritional unbalance, and that the *Monilia* in question is a superimposed phenomenon which converts disordered nutrition into a disease with a distinct personality. Indeed, I have reason to believe from northern people who have visited Puerto Rico for only a short time—weeks or months—and who have developed the disease on returning to their homes in the temperate climates, that this *Monilia* has played here alone, or almost alone, a leading rôle.

I have taken the reader into my confidence in a way which is rarely—almost never—done, feeling sure that these things hailed as discoveries are in reality only the slow

and gradual evolution of an idea to which many workers, perhaps throughout centuries, have gradually contributed. I may be wrong. I may again modify my point of view in this adventurous life which we know as scientific research in medicine. For the *feeling* that one is right can never be made the basis of a scientific conclusion; the most that can be expected of it is that it may serve as a stimulus to urge one to find a reason for one's belief.

4

The sort of physician who will dominate the future is the one who never thinks he has done his duty, or even that he has accomplished anything worth while, until he has shown the victim how it was that he got sick, why it was that he got well, and how he can probably keep well. There is never anything permanent in my mind about a cure until I have convinced myself that the patient knows all about his disease or injury. That is to say, Medical Science for me implies a lesson, is a form of education; and no sooner did I find that a whole people had become ill for lack of knowledge of a few simple facts, than there sprang into my head the idea of a school.

Before the Spanish-American War we hardly ever heard of tropical medicine in the United States. At that time, one had to ask a good many people in order even to get the name of a reputable book on tropical medicine. But the old Army was not caught asleep. It was sending its men into strange hot countries; and it tucked away a nice little green book right in the field desk where, from pure *ennui* if for no other reason, it would be sure to be read. We didn't go to war with novels to loll about with in idle hours. The little green book was one of the very few—six, more or less—that the Army sent into the field with a

Medical Officer. He had the "Army Regulations," "Rules of Court Martial," and "Field Service Regulations," as a matter of course. But "Manson's Tropical Diseases" was frivolous and flighty literature, which had crept in through the astuteness of some patriot; and for me it was an oasis in the desert.

But see how closely medicine and schools are allied. Every man who opened that little green book and sat down and lost himself in it was educating himself. He was at school, whether he meant to be or not. Through it, I was able to discover Puerto Rico's arch enemy. And, as time went on, practically every one of the poor analphabetic wretches who thronged our stations for relief from the "anæmia of the Island" was also taught a lesson. Thus:

"Now remember, when you get well, how it was that you got sick in the first place. Somebody polluted the soil with his excrement that was filled with little eggs of this disease. They hatched in this nice warm sunshine, or even in the shadow of the mango tree, and produced a little tiny worm with a sharp head that, when you put your bare feet on it, bored into your skin and went up through your body to the place where it likes to live, the intestine, and there hung by its jaws and sucked your blood and left you bloodless as you were when you first came to see me. Now I cured you by poisoning those little worms in your intestine, and then I gave you a purge and swept them out of your body. Be careful not to let any new worms get in, for if you do you will get sick in exactly the same way, and maybe this time you will die. Wear shoes to protect the skin of your feet, and always, always do your necessity in a *hole* in the ground where the eggs will die."

This was the first school of tropical medicine in Puerto Rico.

But it was a strange school, for it taught people who

didn't know how to read and write—taught them something, too, that the poet and the politician did not know, that the señora who powdered her face and wore fine clothes did not know, that many a doctor did not know. It created a demand for a continuation of a campaign against the hookworm that has gone round the whole world and is depleting the purse of the richest man on earth. That is what a school can do.

Now the crystallization of all this tremendous effort, from 1904 on, was the idea that its natural evolution should terminate in an institution of learning where the diseases of these hot countries would be given preferential attention. And so, from the military camp at Mt. Gretna back in 1906, I wrote the letter which has already been mentioned, urging the Governor to remember that Puerto Rico's destiny lay in bringing into being a School of Tropical Medicine. Every day of my life, thereafter, I preached that idea. Nor was it long before the Island, by her own efforts, and without a cent of money from any source outside of her own Treasury, had founded the Institute of Tropical Medicine and Hygiene of Porto Rico.

The organization went through a period of some years trying to adjust itself, according to the provisions of the Jones Act, to the Department of Sanitation; but this was impossible. The Department of Sanitation consisted in directing a service based on doctrinal things—things that were known and understood. Our domain, however, was that of unborn things; and we recognized no authority save the supreme one of the Governor.

Eventually we cut loose completely, made the Director of Sanitation a member ex-officio, and divided our organization into permanent members and associate members, electing our own President and Secretary. The latter disbursed the funds and attended to the financial statements.



DR. ASLIFORD IN HIS LABORATORY

[*Harcourt Hull Photograph*

[*facsimile p. 340*

All publications, all plans for work, and all discussion of problems were in charge of the permanent members. Dr. King of the Public Health Service and I were permanent members *ex-officio*, without salary.

In general, the work for the year was divided as follows: three months devoted to an expedition into the country—one such has already been described, namely, that to Utuado in 1913; three months to teaching health officers and nurses, and six months of purely laboratory work, experimentation, and observation of cases.

With this organization my work on sprue was carried from start to finish.

More and more the Institute was becoming a court of last resort, a place of ultimate analysis for things medical in Puerto Rico. We made it a point to spend all of our time in the laboratory from about eight in the morning to four in the afternoon, and in that way became thoroughly imbued with each other's problems. There was no secrecy among ourselves. Almost every day intensely interesting laboratory material was brought, first by one and then by another, for the enjoyment of all.

I restricted my private practice to between four and seven, when I saw my patients at my office at home. From half-past eight until some indeterminate hour between midnight and daybreak, I read contemporaneous literature in medical magazines and wrote up papers connected with my work. To vary this programme I gave myself over, upon occasion, to violin music, of which I am inordinately fond, and played with my friends Chopin's trios, or Pleyel's or Viotti's duets. There is no question about it: a man who is submerged in medical investigation is likely to take refuge in music. Richard Strong used to do it; so did Richard Cabot. But, while pleasant, it is apt to be so distracting that one goes in too deeply.

Chapter XXI

I

AND so four years went by, after my return from the War and from my Cuban mission—four of my most intense laboratory years, which were made possible only by the placid life of the quaint old Spanish port. The heavy masonry of San Juan, its narrow cobblestone streets with their overhanging balconies, the soft chime of its cathedral bells; all this provided an Old World setting in which I could rest after a long day's—and yes, very often—a long night's hard work.

In particular, I remember that one night I went to a dance with my family, but got horribly bored when it was about half over, and, telling my wife that I had to go down to the laboratory, I returned to the scene of my morning's labors.

The laboratory of the Institute was an impressive although sombre chamber, with its vaulted ceiling and its rows of pillars supporting the arches of the old building. I did not bother to light up, for I had a good spotlight on my microscope, and that was all I needed. I had laid out for myself the task of watching the *Monilia* develop to full maturity, from a little tiny bud in the belly of the mother to a fine big pearl exciting the admiration of any microscopist. The stillness was complete, the darkness made blacker by the minute ray of light falling on my reflector, and, with muscles relaxed, there I sat, hour after hour, completely forgetting the world without. entirely

absorbed by the mysterious picture being developed under my eyes in that other, microscopic world, when all of a sudden my neck was encircled by a pair of hairy arms. Long nails dug into my flesh, and a stream of gibberish assailed my ears.

I was petrified by fear that could not have lasted over ten seconds, yet seemed endless. One of my experimental monkeys had broken loose—I knew that at once. But the weirdness, the outlandish vocalization of the poor animal, the actual feeling of suffocation, left me paralysed. It seemed as if my body had died and only my brain were carrying on. The pitiful part was that the monkey had not meant to steal upon me and frighten me. With his soft padded feet and natural lightning movements, he had come to give me an embrace. He had recognized the step of his master and doctor, of the man who had done things to him when he was sick and had then got him well.

Finally, I managed to induce him to let go of my neck and get down on the table in front of me—where he promptly put an end to my scientific study by working his long fingernail into the mechanical stage of the 'scope and removing the slide. . . .

And now in 1924 there came a profitable interruption to this life of insignificant detail, this microscopic life of mine at the Institute. To my great satisfaction, I suddenly received a letter from the United Fruit Company. As a result of costly experience, they had decided to request outstanding tropicalists in medicine to meet in Kingston, Jamaica, for a full discussion of tropical diseases and of the environment which alone, very often, made those diseases possible.

They had sent out seventy-odd invitations for the conference, which was to last about two weeks, and was to be followed by a tournée of all the possessions of the United

Fruit Company around the Caribbean Sea. All expenses were to be paid by the Company, and the Delegate was courteously invited to bring his family with him under the same conditions. I took with me my son Mahlon, who was on his vacation from college.

The size and composition of the shipload of medical scientists incited a warm welcome from our Cuban confrères at our first stop, in Havana. They arranged a medical soirée at which a number of us were requested to speak, each on his own specialty. Prominent among these specialists were Sir Aldo Castellani, whose compilation on Tropical Medicine had become a standard textbook; Dr. F. G. Banting, the modest discoverer of insulin, which at that time was just being popularized; the imposing Dr. George E. Vincent, head of the Rockefeller Foundation; and Dr. Hideyo Noguchi, the famous Japanese bacteriologist. I barely had time, amid the mad rush of official functions and sightseeing, to drop in for a moment to see my beloved friends, the Menocals, and my eccentric patient, Rosalía Abreu—and her ninety-seven monkeys.

(I found her, by the way, looking much better after four years; but still, naturally, complaining of indigestion. Her real status was this: she had no more sprue, being immunized against it by the vaccine; but her digestion was weak. Yet she insisted upon throwing on it all of the load a healthy truckdriver could hope to carry, with the result that her life was simply a series of plain indigestions. I considered her, however, as one of my cured sprue cases. When she died, some years later, it was of heart trouble.)

Of all the friends I made on that trip, none became closer than Banting. We sat together at table all the way to Kingston; and timidly—it was his honeymoon—he made friends with me. One night at the Myrtle Bank Hotel, at a ball

given in honour of the Delegates, he touched me on the shoulder and said:

“I see you do not care to dance, and my Marian is dancing. Let us run off to some quiet place and read each other the papers we are going to present to-morrow, and—and advise each other.”

We had to sneak down the lawn to the shore. And there under a swaying electric light beneath the palms he read me the wonderful story of his work, the light that has flooded the dark corners of a hitherto incurable disease, a genuine conquest of Medical Science. He read it just like a boy who has been told to write a composition and is afraid it isn’t good enough. I interjected a few phrases simply for clarity of expression. He was so grateful that I felt guilty, and exclaimed:

“Good God, man!—it’s the substance, not the words!”

He told me that he knew now what had drawn the two of us together. It was that opportunity which we both had had of directly applying our own remedy, curing our patient, and getting immediately therefrom the powerful stimulus to ambition in research which a successful case brings. He told me, too, that when he graduated he had to make a living by practice. The first month he made \$2; the next, \$8. Then he became discouraged, and was about to give up medicine and go into business, when somebody gave him a laboratory job.

“But,” said he with charming naïveté, “after all, you know, I am only a laboratory man. I know next to nothing of the art of medicine. I’m the greenest man here. All this is new to me.”

At Kingston we were joined by the English, French, and German contingents of our fraternity, among them Sir Arthur Newsholme, the great statistician; Dr. Frederich Fülleborn, the German tropicalist; and Dr. Pierre R. Le-

pine, of Lyons, who brought a special message for me from Leriche, and news of that coterie of men, Policard, Nogier, Regaud, Lemaitre, and others, who formed the famous "Bouleuse popotte" in front of tragic Reims.

In the South American and Antillean delegations we had Dr. Aristides Agramonte, one of the original Yellow Fever Commission in Havana; Dr. Juan Iturbe of Venezuela, a coming power in tropical medicine; Dr. N. P. MacPhail of Honduras.

There were others from our own country of whom we may well be proud: Dr. Charles C. Bass, who succeeded in making the malarial parasite grow outside the body; Dr. H. R. Carter, great authority on yellow fever, especially its epidemiology. Dr. Carter was a friend of many years, and representative of one of the "first families" of Virginia. He was an old man, then painfully ill, and had made this trip only by a valiant effort. The very soul of honour, with a chivalrous faith in his brother knights, Dr. Carter opened every door through which the truth might pass, and never once said, "You are wrong," or "That is not so." He always said: "It may be so, and if it is a question of fact and not interpretation, I'll take your word for it. But I never saw it myself." He was the beloved old man of this Conference—its "grand old man."

This was one of the most illuminating international conferences that I have ever attended, first, because men had taken the trouble to boil down their information and present it in an interesting form, and second, because these men who were receiving the hospitality of the United Fruit Company felt a certain moral obligation to give the best they had in them to such an educational expedition. It is true, however, that Professor Fülleborn was left with his mouth standing open at Sir Aldo Castellani's classification of microbes into little germs and big Germans; that

one of the delegates made the mistake of taking an extra magnum of planter's punch before his turn came to speak; and that Dr. Agramonte made a violent onslaught upon the mild-mannered little Japanese Noguchi, and by his mere personality introduced a serious doubt in the minds of his hearers as to whether or not Noguchi's corkscrew-looking spirillum was the cause of yellow fever.

Noguchi was an out-and-out investigator in medicine; and he saw in tropical diseases the portal through which he must pass in order to reach the fundamental things in bacteriology. After my son Mahlon left for the North toward the end of the Conference, Noguchi sat with me at table and was an inspiration. He and I had known each other before, and had always fancied each other. We were always battling for the recognition of some disputed factor in disease, and we understood each other perfectly. He was a merry little soul—and brave! We were talking about the factors in sprue, and he remarked:

"You air-r r-right. You know how fight. Zey talk 'bout what zey never seen. You—*pick 'em!*"

Noguchi believed strongly in "pickin' 'em."

My own paper at this Conference was on "Tropical Sprue in Porto Rico," a synthesis of fifteen years' work in investigation and 2,200 cases. But the best opportunity I had came up in a discussion of the effect of tropical climate on the human organism. This brought out a contention which I have made all my life in the tropics: that it is impossible for one to sense the abnormal in the tropics until one has sensed the normal for the tropics. In other words, there is a physiology for the tropics and one for the temperate and northern climates. For that reason alone, schools of tropical medicine should be located within the tropics.

One of the most interesting papers presented was by Dr. A. B. Patterson, who gave a beautiful epidemiologic study

of the fight against bubonic plague in that region of Africa bordering on the Victoria Nyanza—a matter of intense interest to me, because these would be the methods we would have to use, in case plague became epidemic among the sugar cane rats.

Both in 1912 and 1921, Puerto Rico had been assaulted by plague, supposed in each case to have been brought from the Canary Islands. In the first epidemic, I had an active part in controlling the disease among the civilian population, and in the latter coöperated as a military officer with the civil government. In each instance the disease was snuffed out before it left the wharves, as it were. In 1912 we had a hundred cases and sixty-five deaths, and in 1921 twenty-nine deaths; the exact number of cases is not remembered but is believed to have been around sixty. From that time on, a constant plague laboratory has been kept in operation for the examination of a given number of rats every month, in order to anticipate any human epidemic.

Dr. Vincent's address was faultless in its English; but he evidently knew very little of the part that Puerto Rico had played in the first development of hookworm disease in America, and made no reference to it whatever in his history of the disease on this side of the water. And it was left to the German, Professor Fülleborn, to arise and tell Dr. Vincent that evidently the Americans, particularly the Rockefeller Foundation, had not yet appreciated the work of the Porto Rico Anæmia Commission.

Fülleborn was Director of the School of Tropical Medicine at Hamburg. I had met him at other international conferences. This man was probably the most distinguished-looking foreigner present, and certainly one of the most scientific. He had been an international figure since 1900. But he was snubbed by some at this confer-

ence, because of his nationality. Lepine, however, treated him beautifully, and walked and talked with him; but the rest, save the Latin Americans and a few English and North Americans, showed their war-prejudice. On this account, when it came to apportioning the delegates among the automobiles that were to carry us over Jamaica on a sight-seeing trip, I made it a point to demand a seat in his machine, with Professor Mühlens of Hamburg, also a good friend of mine.

Fülleborn had gone out of his way, at considerable expense to himself, to pay a special visit to me in Puerto Rico in 1921, just to spend one day talking over the *uncinariasis* problem.

I was sorry not to get to know the South American Delegates better, but one I came to know very well—Iturbe of Venezuela. This chap was a scientist in spite of every deterrent influence that could be brought to bear upon him. In the first place, he was a marvelously successful practitioner of medicine and had a large and lucrative practice, and, second, his relations with the President and his official life were constantly interrupting him in his hours of reflection. Iturbe is a gentleman and an enthusiast and possesses that strange combination of poetic imagination, common sense, and an unquenchable thirst for knowledge which produces scientific results. He works hard, without an audience in his own country; and so he came to this Conference wild with delight to be among men who habitually thought his thoughts and dreamed his dreams.

I always have felt—and I have known him quite well since that time for he has lectured in our School by invitation—that Juan Iturbe has all the earmarks of a great scientist in the making.

After a tremendous farewell banquet, in which the international characteristics of the conference were emphasized by handsome little silk flags for each of the participants, and by speeches more diplomatic than scientific, we embarked for ports in which the United Fruit Company was commercially interested.

Our first stopping-place was Tela in Honduras. Dr. Zuñiga was the Delegate from that country, and now became the centre of attraction. Although none of the officers on the Company vessel seemed to be surprised, we were very much surprised to find Honduras in the throes of a revolution. Just what Dr. Zuñiga had to do with that revolution none of us knew, but naturally he belonged to one side or the other, and there was no doubt about his being an intensely interested party. He was a man of dark complexion with heavy mustache, slightly bald, and decidedly hampered by not being able to speak English. There was a rumor that Dr. Zuñiga was a candidate of the revolutionary party for the Presidency, but I have not the faintest idea that it was true.

We all piled out at Tela to see the Company's plant, which was enormous and had a medical department which was extremely well administered. The company railroad was used freely to get from one place to another. The imported group from the United States lived in a colony of their own. The hospital was huge, of cement, and thoroughly modern in every respect, with good laboratories and efficient nurses. Where the preparation for the medical care of employees was so complete, it was quite natural to find that much money had been spent also to make their homes beautiful and comfortable. But one thing was evident: anyone who became an employee of that Company

lived American, not Honduran. It was said that the Hondurans made tremendous efforts to get permanent positions even as labourers on these plantations, and that from a health standpoint it was better than taking out a life-insurance policy.

It was odd, on returning to the port, to see the other side of the page: dishevelled and ungracefully clothed patriots ripping and tearing up and down the streets and calling upon this national figure to live—*Viva!*—and that other national figure to die—*Muera!* But each was to be done dramatically, not peaceably. All of this was accompanied by a considerable whooping, and a banging of pistols which never seemed to hurt anyone. It might have been, as they say in Kentucky, that they were “jist fixin’ t’ git ready.” But it was diverting enough. We enjoyed it, and so did they. In most of these Spanish-speaking countries, if humanly possible, everything is dramatized. Even so unexciting a thing as the ordering of two fried eggs may be the occasion of a soul-stirring declamatory effort.

On going aboard, I asked for several of my friends, among them a representative of the Associated Press, and found that they had gone on shore to indulge in a banquet on friend Zuñiga; but they were all promised before they went that they would not be molested by “scientific stuff.” And I fancy they were not!

I went off with Castellani and a few others in a small boat to see a Spanish fort, which was said to have been built in the year 1492 $\frac{1}{2}$, more or less. We found this wonderful old fort bursting with prisoners, political dissenters from Zuñiga; and I understood that he did not care to take his crowd there, but passed by with a nonchalant air. When they returned the next morning, it was the effects of a champagne supper and not the extraordinary labours of a

scientific congress that gave them their bleary-eyed appearance and their uncertain step.

At Porto Barrios we again landed and took the train for the city of Guatemala, some hundred and seventy miles away, but we stopped halfway at Quirigua where there was a big United Fruit Company colony and a large hospital. At this place I first came to know well Dr. N. P. MacPhail, Delegate to the Conference and physician to the Quirigua Hospital. Dear old "Scotty"—everybody loved him, burr and all. A man, every inch of him, marooned for life in that God-forsaken jungle at forty-five years of age, too timid to speak in public, self-sacrificing, and loyal. When I was sick, he, sick himself with malaria, got up and fed me and nursed me as tenderly as a mother. I can see him still as he bade me good-by, with a great paw on each of my shoulders and his honest blue eyes looking into my soul.

"God be wi' you, old chap. Gae back tae yer wife and yer pretty lassies and think o' me noo and then, doon in this dom swamp where I'll stay probably till I dee."

Guatemala reminded me considerably of those little principalities of the Middle Ages where the duke, until he was killed to make room for another one, was nearly an absolute monarch. The President at the time of our visit was a full-blooded Indian, and I was his interpreter, to which office I elected myself by invitation.

He gave an afternoon tea in honour of the Delegates on the roof of the Palace Hotel, to which he brought his excellent military band and a group playing mandolins, guitars, and the famous marimba. It was a dignified affair in a beautiful city. Much care had been exercised in the selection from Guatemalan society of *personæ gratae* to attend this international gathering. I was allocated to a table with Sir Arthur Newsholme and his wife.

Sir Arthur was a man of real distinction. In spite of his advanced age, he was straight as an arrow, active as a cat, and had a kindly smile in his blue eyes. Lady Newsholme was an integral part of Sir Arthur. She was a perfectly delightful old lady with a fair complexion, few wrinkles, and pleasant pink-ruddy cheeks, with a half-luminous, half-motherly expression in the eyes. Her resemblance to my grandmother, who had adored and spoiled me, was so striking that I immediately took up that old relationship so long forgotten, and found that she understood it perfectly.

These two old people had no children, but it was worth while to hear her tell how she had adopted one English lad after another, all of whom save one "turned out to be useful men." But I suspected that the one who didn't turn out well was Lady Newsholme's favorite.

Sir Arthur had been picked to respond in the name of the Conference to the President's speech of welcome, and by agreement his was to be the only speech. When the President had concluded, Sir Arthur tapped me on the shoulder: "Now it's our turn."

"What?" I exclaimed excitedly. "You can surely get a better interpreter than I."

He replied: "I want something more than an interpreter of words, my son. I want these people to see how an American can interpret our thoughts."

He spoke in perfect English, and it was dignified, lofty, and exquisitely expressed. He gave me plenty of time between phrases, and I put his thoughts, not a literal translation of his words, into the Spanish idiom. There are times when one is at ease and speaks without embarrassment and hesitation; and, if I never did another thing well in my life, I can at least look back on this with satisfaction.

There was much applause and, of course, among the Latins, a considerable amount of astonishment and ap-

proval, particularly from the President. There must have been at least two hundred Guatemaltecans at table. Neither Sir Arthur nor Lady Newsholme, however, referred to the affair, and I had about concluded that I had been led astray by Latin politeness to consider myself better than I was. But as I bade them good-by on the train, Lady Newsholme said to me:

“My boy, neither Sir Arthur nor myself have told you of the impression you made for him at the tea, for we are averse from fulsome compliments; but I think you will understand us when I say that he and I felt that the outstanding event of this conference was that pretty scene of you two men fashioning the message of our Anglo-Saxon standards, he in English, you in Spanish. I know some Spanish; but I never told you that. And nearly every Latin American present confirmed my estimate separately and enthusiastically in conversation afterwards. It is the first time I have known English ideals to lose nothing by translation into the Romance languages. I’ll see you both in retrospect in the years to come, standing together in perfect composure and harmony.”

Chapter XXII

I

FOR some years, the Institute had been extending a challenge to the universities of North America. Would not one of them, jointly with the University of Puerto Rico, unite with us in providing the United States with a real school of American tropical medicine?

One day there appeared in San Juan three gentlemen from Columbia University: Dr. Carl Vogel, pathologist; Mr. Edgar Moeller, a member of the Board of Trustees; and Dr. A. L. Goodman, internist, a Columbia alumnus. These gentlemen had come down to the Island to consider our standing invitation.

I gave them a list of the accomplishments of the Institute to date, and they were duly impressed. They also were given an opportunity to see that the sort of work we did was never-ending. For instance, we had just taken up the study of filariasis—a disease which had baffled every attempt to budge it from the point at which Manson had left it many years before, and which now was seriously menacing industrial and labouring efficiency.

The facts in the case are, in brief, as follows: a certain very common variety of mosquito (and more than one variety can carry it) swallows the embryo filaria in biting an infected human being. The embryos of this worm are born of a long hair-like adult female lying generally in the glands, usually the glands of the groin. These embryos, little less wide than the red blood corpuscles, are tremen-

dously long, which gives them the appearance of wriggling snakes when seen alive under the microscope. They have the curious habit of swarming by day in the internal organs, chiefly the lung, and of floating out on the bloodstream at night, at Nature's behest, in order that they may be swallowed by the mosquito, in whose stomach they undergo curious changes which develop their sexual organs and bring them to a point nearer maturity. If now, two or three weeks later, that mosquito bites a second host, these embryos, which have by this time migrated to its lower lip, are squeezed out through its exertions in pushing its proboscis through the skin of its victim, and wriggle into the bite left, thus attaining the subcutaneous tissues of man, that is, the flesh just underneath the skin. Very frequently, they manage to float into the lymphatic vessel and reach the nearest lymphatic gland into which the lymph pours; at other times they merely remain in the tissues at the site at which they were injected, here to develop into full maturity, lay eggs, and hatch them within the womb.

Now after a sufficient number of the mosquito-metamorphosed filariæ have penetrated the tissues at the site of the insect's bite and have grown to maturity, suddenly one day the human victim has a severe pain, generally in the glands at the crease of the groin, immediately followed by a hard chill and a sharp rise in temperature to from 40° to 41° C., followed by a rapidly swelling leg of either extremity with a dusky red line running up the inner face thereof to the groin whose glands swell and become extremely painful. This attack lasts at the acme about three days and in a week has practically disappeared, leaving a good deal of weakness and some loss of flesh.

At first these attacks are few and far between, indeed may be a year or two apart, but the tendency is for them to return in a few months and gradually become more and

more frequent, until the patient becomes aware that the regression is less complete than it used to be. As the attacks occur oftener and the interval between grows less prolonged, the affected limb begins to swell—the dorsum of the foot and ankle first, and then to a higher degree the calf of the leg, until the lower extremity begins to take on an ovoid shape.

If this were all, it would not be so bad. But the skin becomes tough and hidelike, taking on a faceted appearance. At times, large hanging tumourlike masses of skin resembling folds of blubbery fat develop; but in reality they are hard and unyielding and even deeply crevassed. These alterations of the skin make it simulate the elephant or rhinoceros hide, hence the term "elephantiasis." Now suppose that the sufferer is not a male, but a pretty society girl fond of dancing! The deformity becomes distressing and, in fact, is only too frequent in countries where the disease exists.

If the sufferer is callous to the æsthetic objection, matters are not so bad, for, from now on, while the limb becomes progressively deformed, the attacks are less violent and less frequent. In other words there is a chronic inflammation of the lymphatic channels. But as time goes by, locomotion becomes more and more difficult, until eventually complete crippling results, and the patient's sphere of activity is confined to his immediate environment. The lower extremity, however, is by no means always the only part affected. In women, the breast may be the site; or in men, the scrotum, and the organ may become so huge as to require a special suspensory apparatus; or else it may localize in the arm. Indeed, I have seen the scalp involved.

Up to the present, only surgery, and pretty gruesome surgery at that, has been invoked to cut away deforming overgrown flesh; but now the problem seems more purely

a medical one: to find for the adult worm some specific poison that will not seriously affect the patient. This is what has been done for syphilis and malaria. The day that puts in our hands a substance of this sort for filariasis will be a grand day of victory for science.

In addition to the quality and kind of our work, the gentlemen from Columbia were impressed by the personnel and the physical advantages which the Institute of Tropical Medicine and Hygiene could offer to any corporation desirous of converting it into a proper school of tropical medicine. It had a staff of technicians, already trained and reliable, and four professors, each of whom had specialized in some important branch of tropical work. It had a good basic laboratory equipment, and an equipment for field dispensaries, portable and all packed, prepared for instant use. Its connections were such that it could secure facilities for clinical teaching at the Presbyterian Hospital, handling 45,000 out-patients a year; the Municipal Hospital of San Juan with a capacity for 200 medical and surgical cases, occupying beds, and a medical and surgical out-patient dispensary; ten specialty hospitals, representing 1,500 beds; the leper settlement, with about 60 patients; and, out in the Island, approximately one hospital for each of the seventy-eight towns, besides the Uncinariasis Stations of the Rockefeller Foundation. There was also the fine library of the Medical Association of Puerto Rico; and there were the facilities of the University itself.

2

We soon received Columbia's expert emissary, Dr. Alwin Pappenheimer. He was a pathologist, about thirty-five years of age; and he was a very keen observer. In an incredibly short while he had accomplished his errand. But

to my great sorrow, he had failed to see—or at least had failed to understand—the attitude of my friends and co-workers, Dr. Gutiérrez and Dr. González Martínez. Pappenheimer realized that there was only one way that Columbia could take a part, an active part, in the development of the school, and that that was by making itself responsible for it from the very first. It could not accept the attitude of the idealist who felt that all things Puerto Rican should be managed by Puerto Ricans. My co-members of the Institute wanted a helpful coöperation from the great northern University. They could not accept a master. They were even willing to allow that northern University to direct the fortunes of the school in substance. They wanted the outside world to realize, however, that it was essentially Puerto Rican, and directed by Puerto Ricans—but by Puerto Ricans who were broad enough to accept policies that Columbia University advocated as policies of the school. In other words, they wanted full power to control the destinies of their own school, which they had taken so great a part in developing to the point which it had reached.

But Pappenheimer felt that if the school were going to amount to anything, it would have to be first American, first Columbian—and then afterwards make every possible concession to local desires. He was adamantine on this point. He felt that the teaching force, and very especially the Director, should be an outsider to represent Columbia, and he said so. That was the price. And with it went official control of the school by a special board of trustees, in which the balance of power would be held by Columbia.

Now there was not the slightest desire on Columbia's part to depreciate Puerto Rico or take from it any of its legitimate honors. What Pappenheimer wanted to do was to make a success of the School of Tropical Medicine of

Puerto Rico; and he knew that Columbia had made a success of everything it had undertaken on the terms he had stipulated. Therefore, he saw no reason for the policy to be changed.

Now the choice had to be made between warm personal friendships and the success of the ideal I had started out to follow so many years ago. I went with Columbia University; and it was with no small degree of grief that I saw those men, with whom I had worked for so many years, withdraw from the organization which they had taken a part in bringing into being. To-day, happily, their friendship for me is just as strong and loyal, and their desire to see our ideal of a school come to fruition is just as sincere, as in the days when we had only ourselves to consult. As Puerto Ricans, however, they still are unable to accept certain features of our organization, which they think is so constituted as to leave their country in a place of secondary importance.

Shortly after Pappenheimer's return to Columbia, in the summer of 1923, the *pourparlers* were arranged between the Governor, the President of the Senate, the Speaker of the House of Representatives, and others representing Columbia and Puerto Rico. It was decided that Columbia should furnish the Director of the School and three Professors, and should pay their salaries. The Island was to pay the rest, amounting to about \$30,000 a year, and to build the new building at a cost of \$100,000. All of this was done by legislative acts so quickly that I was barely able to keep up with the demands made in the name of the Island, which I was practically alone in representing. Handicapped as I was by that fatal clause in the revised statutes prohibiting an officer of the Army in active service from accepting any position involving responsibility in any civil undertaking, it was often hard for me to act officially.

But I was very fortunate in being able to depend absolutely on the loyalty to the Island and its interests, not only of the Governor, but of the men representing Columbia itself; and a mere word was usually sufficient to forestall any action which would be beneath the dignity of Puerto Rico to accept. No one ever proposed any such action deliberately; but very often expressions creep into a contract which, although they have no special meaning at the time, can later be given a meaning prejudicial to one or the other of the contracting parties.

Finally, the definite positions of the two contracting parties were fixed. The law creating the School and providing for its building passed both houses and was signed by Governor Towner; and the Governor and myself, both of us worn out, retired to his country home to talk over quietly the next step to be taken. There was no question about the quiet and seclusion that attended those talks. In fact, no other person was present. But need for hurry there was, and every minute of the time was spent in practical work.

Where was the school to be situated?

Governor Towner rather favoured placing the School outside of San Juan, on the campus of the University of Puerto Rico, of which officially it is a branch. But I stoutly held out for a downtown site. With my instinct of a physician, I wished to build that School into the heart of the city where it would be constantly seen and live vividly in the imagination. I wanted it to be a beautiful building, compelling the attention of every passer-by. And I wanted it to be a place to which people would go for light. They would "stop by" a thousand times, whereas they would have made a trip to the town of Río Piedras, where our University is situated, but once. He good-naturedly gave in, and the site selected was a handsome one

on the ridge of the neck of land separating the old walled city on its small island from the rapidly growing new town built up on the mainland.

Then came the question of the size and architecture of the building. Now, up to this point I had taken an active part in everything, and very often a deciding part; but if there were one thing that I could never do acceptably, that thing was to draw. As a child, I studied sketching; as a young man, drawing and architecture; and, as an Army officer, I utilized both, but I was never able to satisfy myself. And so when the Governor said: "Before morning I want you to prepare me a sketch of this school as you would like it to appear," my heart sank.

To do myself justice, I did have a concrete idea of how I wanted it to appear. It was already nearly eleven o'clock at night, and I was so tired and sleepy that it didn't seem possible. But I shook myself together and went at it, showing the Governor in general the lines of the building I was about to draw, before he went to bed.

And there I sat from eleven o'clock until six in the morning, looking down the dark valley that opened like an enormous maw from the shelf on which we were, 2,500 feet above the Caribbean Sea, from a wide piazza filled with every comfort, but by its very comfort inviting me to lie down and sleep in the cool balmy air. I chose as my model the well-known Spanish architecture redolent of the Moor. The building provided for seven distinct departments, a library on the second floor, and an assembly hall on the third, or top floor. It was, of course, to be built of reënforced concrete, elaborately decorated in harmony with the architecture. There were two wings, which could easily be joined by two others of the future hospital, thus enclosing a familiar Sevillian court.

I submitted this castellated structure, projected on paper,

to the Governor, and we descended the mountains to San Juan together, reasonably well satisfied with the results of a hectic night. This sketch was turned over to an accomplished architect in the employ of the Insular Government, Mr. Gonzalo Fornos, and he, with due regard to its Spanish parentage, has crystallized the idea in the present School of Tropical Medicine.

When the building was completed, it was found that the architect had placed at the end of each of the wings, high up on the wall, a monogram in high-relief letters of blue—P.A.U. He was asked what they meant, and he said he didn't know; that he had found them on the plan I submitted, and had provided for them in the construction of the building. I kept them all in suspense for at least a week, but finally I had to release the information. They stood for the future name and scope of the school. P.A.U.—Pan-American University.

3

September 22, 1926, was selected for the formal inauguration of the School of Tropical Medicine of Puerto Rico. It was a starry and beautiful night, and all of San Juan had turned out to make it a gala event. The stage of the theatre where the inauguration ceremonies were held was hardly large enough to accommodate the participants. After a tremendous amount of arguing and hard work, I had succeeded in persuading the San Juan Symphony Orchestra to furnish the music.

In no part of the *discursos* made that night was there any reference to the great underlying forces and efforts which had given life to the School. For all that was said, it might have been an idea of yesterday confabulated in the Capitol. But the very omission of the part played by the Porto

Rico Anæmia Commission and the Institute of Tropical Medicine and Hygiene of Porto Rico, and of the men who incarnated those two portents of the new life for Medical Science in Puerto Rico, was so glaring that they were uppermost in the minds of every person in the audience, every person who took part in the programme. Those memories did not heed to be invoked by the spoken word; and they gave a spiritual value to the ceremony which no omission or defect could take away.

Imagine the thoughts and the memories that crowded in upon the mind of at least one man present. For back of all the pomp of a great university festival stood the silent beseeching figure of the pale, bare-footed labourer of Puerto Rico; and in reality it was to him that we had dedicated this day and these tardy honours, in recognition of a right so inalienable that every government on earth has recognized it from the beginning of the world—the right to live.

Chapter XXIII

I

THREE is something inspiring to me at the mere sight of the School of Tropical Medicine. I have never yet gone there, to my laboratory or to listen to the fruit of the work of others, without feeling its effect upon me. It stands for everything in my life that dreams have clustered around: daydreams and night-dreams. Its busy laboratories all have their little dramas, constantly unfolding. Often one has to take a microscope to see them. Or again one may have to take many a wild flight into fancy, in order to get a glimpse of what one has foreseen. There is never a moment when something is not going on, some real adventure being experienced, somebody's fate in the balance.

At the present time, this is the only school of tropical medicine under the American Flag in tropical America. It is a school, in that many lessons are learned here. It is even a school where a student's record of qualifications is kept, and where he may be accorded a diploma and, in special subjects, a certificate. But it is not a school in the sense of repeating year after year courses which may be found in any good textbook. It is more like an academy in the Greek sense, where the students take a part in the discussion. And, above all, it is a school of experimental medicine, of research in which everyone is supposed to take an active part. It is a great centre with laboratory facilities for working out problems in clinical medicine, public

health, chemistry, bacteriology, mycology, parasitology, protozoölogy, immunology. Many a man has come to us from far away, often a professor himself, who has been devoting his life to the working out of some problem like leprosy, *ulcera pudendum*, or sprue, here to work up his study, and has found all he needed in our excellent pamphlet library, with collections running back ten to fifteen years of some 150 medical journals from all over the world. We have obtained priceless information from such students, each one of whom is helping to enrich the School by his own research and the experience he has brought with him. We give such a man plenty of information too, but he keeps us in touch with that world of science which is boiling and seething all around us. A large part of our expenditures are made to bring here great authorities on this or that theme of tropical medicine.

I myself am Professor in two subjects, Mycology and Tropical Medicine. As Professor of Mycology, I have my laboratory and my assistant. This laboratory is on the third floor of one of the two castellated towers, and represents a very new thing in Medical Science.

We have seen the body invaded by parasites—in fact, all invaders of the body are parasites, generally worms, belonging to the animal kingdom. This, helminthology, is the oldest of the specialities in medicine. Then we have the minute, microscopic, simple, generally one-celled animal parasites, called the protozoa, best known by the amœba of dysentery and the plasmodium of malaria. Then comes the recent development: bacteriology, the study of the tiniest of parasites about which there is still raging a war as to whether they are simple forms of animal or vegetable life—a battle now practically decided in favor of the latter. All of these subjects are important specialities to-day, and each has its professorial chair and its laboratory.

And now we are admitting the newest of these specialties: mycology, or the study of microscopic plants that invade man. The prototype here is the cause of ringworm, the so-called trichophyton. These organisms, however, as a rule invade the body *only when the resistance to them has fallen greatly*, allowing them to nourish themselves at the expense of their host. While it is true that the majority of diseases with which they are associated are really caused by those conditions which made their growth in the body possible, it is also true that only when they are present do the peculiar characteristics of that disease appear. For instance, it is very hard for us to find a case of true sprue, which has not yet reached the stage of wasting cachexia, that is not accompanied by a heavy growth in the intestine of a fungus, a yeastlike body indistinguishable from *Monilia albicans*, the cause of thrush; and it is even more difficult to find a case of ringworm of the scalp which does not present us with the undeniable picture of a trichophyton.

The advent of this important specialty in medicine has accompanied a tremendous awakening in clinical medicine to the undeniable fact; namely, that there are certain specific, typical diseases, contagious and infectious, whose causative agent will not invade the body until a certain degree of lack of resisting power to that disease-producing organism has developed. By imitating physical stresses which have destroyed or reduced that resistance to the invasion of fungi in man—that is, by inducing the same sort of stress in animals—we have succeeded in producing in animals the diseases which these germs are capable of producing. For instance, you may feed a healthy monkey indefinitely with *Monilia albicans* and in the vast majority of cases never produce either thrush or sprue. But if you make that monkey eat food which he cannot easily digest

and then feed him the same organism with which you previously failed, you *can* produce either sprue or thrush, and so on.

But, on the other hand, some of these plant invaders seem to possess of themselves great aggressive power and invade and produce the disease without any preliminary strain or deterioration in health. Notable examples of this are seen in sporotrichosis and blastomycosis, one causing a serious disease following the glandular system, and the other causing rapid death through a series of symptoms not unlike those of cancer of the skin.

Within this specialty of mycology, my laboratory specialized on the yeast-budding fungi, because clustered around that persistent yeast found in my cases of sprue were a large number and variety of others bearing a family resemblance to it and yet differing from it and incapable of producing sprue. In fact, among these were the dreaded and deadly organisms producing the fatal blastomycosis of which we have just spoken, not to say anything of a host of perfectly harmless species. Now these different species by no means look always alike, nor do they always grow and produce the same reactions in sterile media. The medium on which they grow may differ radically, such as the medium of potato, or of pineapple; or the same medium may undergo very different changes in appearance, according to the organism sown upon it. Or by simply changing the degree of acidity of the medium, the growth of the organism may be totally stopped. So here we have also a study of media as well as of organisms.

These details are mentioned simply to show by how many devious paths and heart-rending details one is finally able to say: "This is the son of John Smith, and none other," or "This man has coloured blood in his veins, and no mistake." The consequence is that when you walk

into my laboratory, you find neatly arranged row after row of test tubes with a jellylike clear solid medium on which are growing nearly all of the listed families of all of the different fungi known, with pedigrees as elaborate as those of Europe's royal families. In fact, they have been collected from all over the world, and growths have reached me from collections in the Institut Pasteur, from a famous laboratory in Holland, from another in Tokio, and so forth. And anyone who is interested in any one of these organisms can find it here, and also find all of the equipment he may require to do about all he needs in order to write a complete scientific treatise on any one of them.

Let it be said also, in passing, that the colours developed by these organisms are the most gorgeous of any laboratory growth. It is surprising to see what delicate shades of grey, mauve, lavender, and cream are produced. But where mycological cultures excel is in their reds and oranges. Nor can more fantastic shapes be imagined from the honey-comb of the bee to the elaborate detail of a great forest.

2

There is still another quite distinct and separate professional chair to be considered: that of Tropical Medicine. The old masters under whom I studied medicine developed in the age with the developing laboratory sciences. And Walter Reed, the most intense laboratory student of them all, whose first assistant I was before I joined the Army, said to me:

“Never lose sight of the case. Take a good clear history. Don't become impatient with the sick woman who wants to tell all her symptoms. Put them all down. They may be of use to you.”

And they were.

I have always followed this principle, and have never failed to work from patient to problem. Nine times out of ten, most of what the patient wants to tell you is irrelevant. But not the least of your duties to your patient is to make of him a psychologic study, and this is the grandest chance in the world.

There are two sources from which my scientific material is culled. One is my private practice, and the other is the out-patient dispensary of the University Hospital, of which I am Chief of the Medical Service. Now most of these people have seen doctors before and are still sick. A large percentage of them have banal affections which are the result of unhygienic living or thinking. But there remain very nearly a moiety who fall into very interesting classifications. And close attention to their stories will bring out more vividly than in any other way the actual harm which diseases properly called tropical can do. While I do not propose for a moment to run the gamut of all of these affections, I would like to illustrate the problems by a few of such typical cases.

There are always a certain number who complain of serious interruption to their work by recurrent attacks of filariasis, which has been sufficiently referred to. The point is, however, that an opportunity is thus offered to institute on a large scale a series of careful observations of the result of a well-thought-out plan of treatment; a treatment which, of course, has been first tested on animals if possible, or else used sufficiently in a few intensely studied cases to assure us that it will do no harm. The people will even come with great regularity to this hospital by night to have their blood tested, and thus by counts of microfilaria permit a check to be placed on the efficacy of the method used.

Then comes the extremely interesting problem, which

at present is passing through the stage of being interesting to an idle public avid of new sensation, but which is very soon going to intrude itself very unpleasantly on Mr. H. and Mr. A., and Mrs. B. and Mrs. C.: and that is schistosomiasis.

Now this cursed disease has no popular name. It is caused by a visible worm several inches long, the female looking like a leaf rolled up vertically, from the two ends of which hang out the ends of a soft cylindrical limp structure which from its shape gives no hint of what it is—in a word, the male. This odd pair lie in the portal vein or one of its branches in close connection with the spleen or the liver. Every so often the female migrates against the current of the blood down into the veins of the rectum, where she lays her eggs, and then returns to her previous place of residence. The eggs have a sharp thornlike structure on one side and, by means of it, ulcerate through the vein into the rectum and appear in the fæces, the examination of which gives the correct diagnosis.

This terrible disease, thus initiated, has caused many a death in Puerto Rico. Either the spleen or the liver increases enormously in size—but more especially the spleen—the patient then dying of anæmia and exhaustion, accompanied by an incoercible dysentery, the result of the ulceration of the rectum as above described.

But to follow the normal course of nature: these eggs, passed out with the fæces, often are washed by the rain into water courses which enter into lakes and ponds. And here the eggs hatch curious-looking aquatic animals with an infinite number of long feelers. These now penetrate a particular family of snails which they parasite as they did the human host and undergo their final metamorphosis. The resulting free-swimming *cercaria*, so called, now leave the snail and await an opportunity to bore into the skin of

some unfortunate person who may be wading around the edges of a stream or pond.

The first known of this animal was in Egypt where a different species, instead of attacking the rectum, ulcerates into the bladder, causing the most frightful complications. We have had a large number of cases of this fearsome disease with enormous spleen and, up to very recently indeed, entirely incurable. But, thanks to the activity of helminthologists in the Orient, a remarkable chemical compound, which has been named "fouadin" in honour of the King of Egypt, is beginning to be considered as possibly an efficacious means of cure.

Our School has distinguished itself of late by its cures of a large number of these cases, otherwise condemned to die, and has contributed a large amount of valuable scientific literature. Indeed, if not the first in America to use this specific, our Island is quite the first to prove its worth on a large scale, and to put Americans on their guard against the disease—a work begun back in Mayagüez in 1904 by a member of the Porto Rico Anæmia Commission, Dr. González Martínez.

We have also a considerable number of cases of skin diseases. These are referred to the Department of Mycology for elucidation; and so on, through a great variety of purely tropical affections from which we draw many of our patients for observation, study, and treatment in the hospital.

On the other hand, we see, as in no other place so well, the rapid inroads which badly distributed primal food elements cause when they are out of balance. As has been said heretofore, I believe that this nutritional unbalance alone is responsible for more chronic ill-health in Puerto Rico than any other one factor making for disease. And

the same undoubtedly holds true in other tropical countries where the food is similarly unbalanced in its proximate principles. The chief remedy here is a patient but incisive and enthusiastic education of the public on what to eat and how to cook it. It is more difficult to change these basic habits of living than to do any other one definite thing in Puerto Rico. But in justice let it be said that out-patient dispensary conversations, together with a few simple remedies to aid digestion, have done more real good than all the medicine we have given. For, once we have gained the confidence of the patient in Puerto Rico, he will really try to do what we want him to do, even to the point of dieting himself, which is going pretty far.

3

And now let us climb the stairs and go into the nice clean airy wards of the University Hospital where the sick are studied, where the most elaborate examinations are made, and where treatment is systematically administered. There are four of us who take a turn of three months each in making ourselves responsible for the proper study and treatment of these cases. It involves much more than a daily visit to each and every patient, for I myself prefer to make certain delicate examinations, especially cultures and those of the blood. Out of the accumulated material thus collected, the Professor is enabled once or twice a year to offer some original contribution to tropical medicine.

In my case, an additional source for material is obtained from certain poor people too proud to ask for free treatment at a public clinic. These seek me in my private office, where they are not denied.

Out of this contact with patients and cases and hospital

and laboratory arise situations which have to be met in a very practical way. At first they are small and have the importance of any other thesis or problem. Later they become larger and larger, until the demand for their solution is so great that everything else is dwarfed; and so at this time it was with the ever-present anæmia of the Island.

Anæmia has always been for Puerto Rico a sinister figure, but I never thought for a moment when I discovered its chief cause among the labouring classes that I had been able to explain all of the anæmia of the Island. When I took up my investigation of sprue, I found myself at grips again with anæmia, this time not affecting the labouring man in the country, but the urbanite. Shortly after the School was inaugurated I resolved to take a series of such cases of sprue accompanied by, or terminating in, anæmia, and follow them either to their cure or to their death by daily blood examinations, erecting charts to plot the course of the disease accurately.

It was a stupendous undertaking, covering two years' work, for it involved not only a study of the blood but an accurate study of the mycologic side of the question as well as the nutritional one. In all I was able to present data from twenty-four cases, and a few of these cases occupied beds in the University Hospital.

I naturally gravitated first to a consideration of the blood. Certainly here great havoc had been wrought. What usually happened was that after a longer or shorter period of typical, or atypical, sprue there would be a period of chronic indigestion, of great emaciation, and failing strength, and then a gradual descent in blood values to the point where the uninitiated would promptly diagnose "pernicious anæmia."

Now pernicious anæmia in temperate climates is a fearsome disease, well known for many years as "Addison's

Disease." It is characterized by a profound descent in blood values, more in the number of red corpuscles than in the colouring matter, or haemoglobin. Clinically it has been characterized by a gradually deepening pallor of a lemon-yellow tint, with indigestion and a sore tongue, but still a conservation of body weight. The most curious phase of this unfathomable disease is that later certain striking nervous phenomena supervene, which point to a degeneration in certain definite parts of the spinal cord, resulting in a peculiar gait, and modification both of sensation and motor activity of the muscles.

Now it so happens that up to this time the term "pernicious anaemia" had been applied only to that incurable and heretofore almost invariably fatal disease which had been described by Addison many years before. But this disease was not the pernicious anaemia we saw in Puerto Rico. Here the anaemia was all too frequently pernicious, in that it would kill; but several very important differences existed, notwithstanding the fact that men in tropical medicine the world over, but especially here, had been calling it pernicious anaemia as though it were the same disease as that seen in the temperate climates. It was true that the blood picture was very much the same in the two diseases, but it was noticed that the nucleated red blood corpuscles were much more frequent in—indeed were considered characteristic of—Addison's Disease, and that in our pernicious anaemia they were exceedingly rare. Moreover, fatal as our pernicious anaemia was, it was not nearly so fatal as its northern brother. And our anaemia was generally accompanied by tremendous losses in weight.

But of all the distinguishing clinical factors, nothing was so outstanding as the previous history. In almost every one of our cases of pernicious anaemia, skilful questioning would bring out a background of a previous attack of

sprue—if, indeed, as was only too frequently the case, active severe sprue did not concomitantly exist.

So it was not very long before I had come to the conclusion that there was more than one kind of pernicious anæmia—one, of the temperate zone, mysterious in its mode of onset and utterly inexplicable as far as any known cause was concerned; the other, which henceforth I referred to as a “pernicious type of anæmia,” a legitimate outcome of sprue, with a definite cause and a reasonable explanation for its development.

Now come on the scene, in this remarkable unfolding of a fascinating tale, first, a scientific advance in our understanding of pernicious anæmia from the accurate measurement of red blood corpuscles and the realization of why they vary so greatly in size in the course of this disease, and, second, the advent of liver extract in the treatment of Addison’s Disease in the temperate zone.

The extract, introduced by that great medical philosopher, George C. Minot, was, strangely enough, consciously or unconsciously, the treatment used in the Orient with great success for severe cases of sprue. But there it was purely an empiric measure—consisting of the feeding of liver broth—and was not even remotely connected with any scientific deduction. Minot, however, traced the effect of liver extract to a stimulation of the mother-cells in the bone marrow, which were the source of the red blood corpuscles. Minot’s discovery spread like wildfire, and I was privileged to be among the first to whom this extract was given for the experimental determination of its value in clinical medicine.

But now we must step back a bit and see what the scientists were doing with the blood of pernicious anæmia. For a long time a great deal of stress had been laid not only on the fact that in the pernicious forms of anæmia the red

blood corpuscles tended toward great misshaping, but also that the size of these cells varied from tiny things one-third the normal diameter to great huge cells much larger than they should be. It was when the average diameter of the red corpuscles was markedly excessive ($\frac{1}{1,000}$ of a millimetre or more) that we began to suspect a pernicious form of anemia. The newly born red cells—the large ones—were being hustled into circulation before they were really matured, as if the great demand to replace cells lost by premature death was prodding the mother-cells to make up for intolerable insufficiencies which Nature considered an emergency.

The balance had been broken. Red cells were being destroyed faster than the mother-cells could make new ones; and it was Minot who brought out a measure of this situation, by his description of its relation to a cell which had been recognized before, but the true significance of which had not been understood—the so-called reticulocyte. A reticulocyte is a new-born red blood corpuscle of any size, so new that it still contains shreds of nuclear material (for all red cells are born with a nucleus and normally lose it before they enter into the circulation). The nuclear shreds are stainable only vitally, i.e., when alive, by cresyl blue. This cresyl blue is taken up selectively by the little shreds of nuclear material in a reticulocyte; and thus all such immature cells can be identified quite easily. On examining the stained specimen, a bright little skein of blue threads will be found upon the red background of the blood corpuscle.

These were the cells which Minot found were vastly increased in number as soon as liver was administered for the treatment of Addison's anæmia of the temperate zone. Unless the reticulocytes increased on or about the sixth or seventh day after giving liver, the case could not be expected

to get well under that treatment, and might even be considered as not pernicious anæmia at all. Moreover, in a very general way, the intensity of the disease could be measured by the number of reticulocytes which could be produced by liver-feeding in this disease.

But a curious thing happened in our Puerto Rican varieties of an anæmia pernicious only in type. About half of them failed to respond thus, even when large doses of the extract of liver were given by the mouth.

I resolved then and there, by utilizing my twenty-four study cases, to make this the subject of the contribution of American Tropical Medicine at the International Congress of Tropical Medicine to be held at Cairo, Egypt, in the winter of 1928. I would base the work on the theorem that our so-called cases of pernicious anæmia were not true pernicious anæmias at all, but were *exhaustion processes* in advanced stages of tropical sprue. I would proceed on the assumption, when cases of our pernicious types of anæmia refused to respond favourably to liver extract, that they resisted not only because there was a lack of that mysterious substance stored in the liver for the sole purpose of stimulating the mother-cells of red corpuscles, but also because *by malnutrition these mother-cells themselves had fallen off in their productivity or had died in such enormous numbers as to reduce maternity considerably in the bone marrow of advanced cases of tropical sprue.*

Now makes his appearance a notable scientist and clinician, Dr. William B. Castle, of Harvard University. By one of the most ingenious experiments on human beings ever elaborated, Dr. Castle showed that the mucous membrane of the stomach built up a mysterious substance, which, uniting with some equally mysterious substance in the protein of animal origin, such as meat, produced that third substance, most mysterious of all, which was stored

in the liver of man and animals for the express purpose of releasing tiny quantities, the amount gauged by the necessity, of a hormone, or messenger, to prod the distant mother-cells in bone marrow into bearing red corpuscles.

At last we knew enough of the whole story to piece out the rest: the pernicious anæmia of the temperate climate, or Addison's Disease, whatever its primal cause, was a progressive loss of power to produce that hormone, that goad to the liberation of red blood corpuscles. Notwithstanding the fact that these mother-cells had aborted a huge number of immature red blood corpuscles, and that the bone marrow, normally yellow, was converted into a red, semi-liquid mass of such cells, the absence of this hormone prevented the re-stocking of the blood vessels, and the patient slowly died of the effects of anæmia, of this lack of that which in all times has been the very symbol of vitality—red blood.

But Castle did more than this: he came to Puerto Rico, and here he put into practice what for many months had been flitting through my own mind. He prepared a solution of liver extract which could be *injected* into the body and thus directly stimulate the mother-cells. It is true that a German scientist had preceded him, but it is also true that it was he who made this step in the treatment of the disease a feasible procedure within the reach of every doctor in the land.

There was a very special reason for finding an injectable form of liver extract, namely, that when this substance was given by the mouth we were not at all sure that it would be absorbed. Indeed, we were rather sure in some cases that it was not absorbed, and that if it had been injected it would have produced the same results that it had produced so successfully in Addison's anæmia of the temperate zone.

Since beginning to use this injectable form we have

found that many more cases of anæmia of pernicious type, following or accompanying sprue, have been cured than heretofore. But, even with this refinement, we are still finding a large number of cases in which, through malnutrition of the bone marrow, there is an insufficiency of the apparatus provided by Nature for a re-stocking of the vessels with normal red cells. And for *this* problem there is but one solution: a rehabilitation of the mother-cells of the bone marrow by the Ashford diet used for the cure of tropical sprue.

In short, although liver extract will cure the most formidable form of anæmia, it will not cure all anæmia. As a matter of fact, anyone can see with half an eye that it will cure only an anæmia due to a lack of release, on the part of the mother-cells in the bone marrow, of red cells which are needed to replace those worn out in circulation. It will do no good whatsoever to those anæmias in which there is a dissolution of the blood in circulation due to poisons, whether chemical or biological.

Thus we are finally arriving at a solution of our great problem, and in the end it all harks back to the primal question—an adequate supply of all the substances needed for the repair of healthy human organs. The problem, we now see, is a medical one only when the laws of correct living are disobeyed; when man seeks by short cuts to improve on the forces of Nature. There is even good reason to believe that a true anæmia of pernicious type can and does develop out of a *nutritional unbalance under the stress of tropical climate*.

Up to this time, tropical medicine has concerned itself largely with the new and fascinating study of outlandish invaders from the parasitic kingdom that surrounds us on every side. It is high time now that we look our problem straight in the face, and see that often these parasitic ene-

mies will be fought off only by building up a strong and healthy body with unusually good and sufficient food. It is not enough merely to avoid the parasites—we cannot continue this evasion indefinitely. Our problem is not to make it possible for physically inferior races to live in the tropics despite the menace of parasitic invasion: our real problem is to fortify, by proper nutrition, a race of tropicalists that can successfully compete with their brothers of the temperate climates, really less favoured by Nature than themselves.

Chapter XXIV

I

WHILE in the very midst of this research, I received an urgent invitation to visit the President of the Dominican Republic, Don Horacio Vásquez. One of his family had been sent to Puerto Rico for treatment by me, and I had incorporated her case in the study shortly to be presented in Cairo. This lady, Doña Ercilia Moya, arrived here in almost moribund condition and was one of the most terrible cases I had. After a persistent struggle, however, she entirely regained her health, and I sent her to her home.

Now it happened that not only was she a sister-in-law of the President, but also she was a woman singularly beloved throughout the length and breadth of Santo Domingo, and it is really no exaggeration to say that the President's invitation to me to visit Santo Domingo was in part due to popular demand, in order that her many friends might show their appreciation of her cure. Furthermore, the Archbishop of Santo Domingo had been another patient, and had become my excellent friend. He was an unusually well-travelled, well-informed man with one of the most remarkable histories that a prelate has ever had. For at the very height of one of Santo Domingo's most violent revolutionary upheavals Archbishop Noël was made President of the Republic! I was sure that between these two men I would be given a unique opportunity of seeing the historic relics in what to me is the very centre of the begin-

ning of modern civilization in America. And I was not mistaken.

We were met out in the open roadstead in front of the city of Santo Domingo by the President's launch, and conducted immediately to his palace, where I presented my wife and my daughter, Gloria. We had the President's automobile placed at our disposal and were taken to our hotel, where we were given a beautiful suite fronting on the shady and historic plaza and park of the cathedral.

The medical fraternity had arranged a tremendous programme, which included the delivery by me of an address on the anæmias of hot countries. And they had asked the President of the Republic to preside, which he did. This address, naturally, was adjusted to the lay public, but a lay public which nevertheless possessed full capacity to understand the subject when shorn of its technicalities. As I had only the afternoon in which to prepare this address, and as our apartment was constantly besieged by visitors, I be-thought myself of my friends in the cathedral and went over to the episcopal palace in acceptance of a cordial invitation on the part of the Papal Delegate, Monseigneur Lamarché, to rest up that afternoon in the Archbishop's bedroom.

Now this turned out to be one of those rare experiences which come unbidden to a man, but which leave a long and grateful impression. The episcopal palace is an ancient, unobtrusive building in harmony with the cathedral, and really a part of it. The study of the Archbishop on the second floor looks from a high gallery directly into the altar. This study is a large fine library room, furnished with the most handsomely carved old mahogany furniture it has been my privilege to see. It dates back to the time of the building of the cathedral, and is as much a part of it

as its roof. The bedroom also commands a fine view of the church from the gallery within.

I lay down on the magnificent mahogany bed with its heavily embroidered coverlet, in a room severely plain but elegant; and here I absorbed the full peace of a beautiful afternoon, after the clamour of a long line of people who had come to see me with the idea of having me merely look at them, and give them prescriptions which would cure them instantly of all their ills, most of which were imaginary. It was not sleep that I needed: it was this peace and quiet. As the Archbishop was not on the Island, the Papal Nuncio was occupying his quarters. Monseigneur Lamarché was a most interesting man, very human and essentially French, although Dominican born. He stole in and told me the fascinating history, as we leaned over the parapet of the gallery to gaze into the cathedral, of how Sir Francis Drake had quartered himself and his men in there, had tied his horse and fed it at the altar of the Virgin in "that little chapel over yonder." He also told the story of how an old French archbishop had sat in that tall, high-backed mahogany chair, here just below us on the episcopal side, and had ordered the unmarked floor dug up in order to find the remains of Christopher Columbus, the correct location of which he had culled from carefully hoarded documents not carried away by the Spaniards in their hasty abandonment of Hispaniola to the French a century or so before. He told how the Spaniards had previously opened a vault supposed to contain the remains of Christopher Columbus, but which had really contained those of his son Diego in an unmarked coffin, and how these had been carried first to Cuba and then to Sevilla where they were magnificently entombed as being those of the Discoverer. And then he related how the French archbishop on the day in question had finally had to rise himself and

strike a pick under one of the big pillars, to prove from the hollow sound that another vault lay there beside the empty one.

"At this point," said Monseigneur Lamarché, his eyes eager with excitement, "he ordered all the doors of the cathedral closed and locked, and sent for the dignitaries of the Dominican Government and the newly arrived Spanish Consul. Once all had gathered together, he himself again took the pick and drove with such accuracy that it went clear into the unopened vault. Little by little they opened it sufficiently to disclose to the astonished group the original casket containing the remains of the *Gran Almirante*, as the coffin was marked. Either to-morrow or day after to-morrow," said Monseigneur, "you are going to be accorded a great honour. The coffin you see down there, raised, in the polished marble memorial at the entrance to the cathedral, is the outer one of three. The Mayor of the city has the key to the outer one. The Minister of Hacienda opens the next. But the key to the original coffin itself is here in my possession. These three coffins will be opened, and you will be allowed to glimpse all that remains of the Great Admiral. We do this very seldom for anyone, and it has not been done for many years. But the President has ordered that it be done for you, your wife, and your daughter."

And thus we passed the afternoon. As I lay there with the birds twittering in the branches of a tree that had seen more than one century pass by, I thought to myself: "I am lying in the very cradle where American history was born; and just below me still sleeps the man who on bended knee, some four hundred and fifty years ago, delivered the New World over to his sovereigns, to raise up a great people in the name of God." And then I dropped off to sleep.

I was awakened by Monseigneur, who approached me rather diffidently and said: "Son, we priests and doctors are called upon to perform our sacred mission in divers times and places. It is your turn now to respond to a call which you cannot very well refuse. There is a poor woman down below. She has brought her sister, who is ill and wants to be examined. They are good people, and I am beholden to ask you to do this favour for the Church."

"Of course," said I, "I shall cheerfully do it. But, Father, where in the name of Sir Francis Drake are you going to find in this sacred building an adequate place to examine a woman?"

Well, he thought that his own mahogany writing-desk might not be so uncomfortable to lie upon. And so with the help of her sister I had to do all that I could do to fathom that poor creature's complaint, which, fortunately, was easy to diagnose. But they had followed me into even the last refuge, which I had thought impregnable.

I gave up then, and had a cold shower. My evening's address would have to be extemporaneous. We took a little wine, heard some excellent organ practice afterward; and I went to my doom, refreshed.

Early the next morning, we found ourselves delving about in the earth in the basement of the fortress built by Diego Columbus, and which was the immediate cause of his being sent back to Spain with his father in chains, by the ferocious new Comendador, Bobadilla. Here we had the good luck to discover some old coins of the epoch, which I still preserve.

The President had planned for us a trip across the Republic to the town of La Vega, through the most historic part of the Island, and the most beautiful. For just before one reaches the town there is a hill, rising abruptly from the plain of the Cibao, which for beauty and luxuriance

of vegetation cannot be equaled in the whole of Santo Domingo. This hill, called the Santo Cerro, is surmounted by a church; and historically it was the spot where Christopher Columbus, his brother Bartolomé, and a stout little band of those old warriors of Spain, whose exploits seem to us almost incredible in these times, defended themselves for days and days against howling hordes of wild Indians bent on their extermination. At a particularly dangerous moment in the battle the Virgin Mary appeared on the hill, and the Indians fled, leaving Columbus to dedicate it forever to the *Virgin del Socorro*.

At the foot of the hill, after fording the river, we were met by the Governor of the Province, Don Teófilo Cordero y Bidó, with all of his staff. This dear old soul, for he was a fine country gentleman, was so genuinely glad to see us, devoted as he was to Doña Ercilia, my ex-patient, that he was almost speechless. It was the loveliest part of the day; and here, in a beautiful grove of mahogany, they had planned a sort of afternoon tea, complete except for the fact that something much more convivial than tea was served. Under the benign influence of this substitute, the doughty little Governor quickly recovered the use of that organ which in the memory of man he had never been known to lose before, and launched into what proved to be probably the most eloquent and certainly the longest speech he had ever delivered. It was dusk by the time he had reached the point where the keys of the city were pressed upon me. Then, the Governor and his party of citizens forming a cavalcade, we slowly swept into the pretty little town smothered in huge old trees, some of which may have known the armoured men of the Admiral himself.

It was now half-past nine at night; and the long dining table of Don Binbo Moya, the husband of Doña Ercilia,

was groaning with the weight of food and the elbows of some ten or fifteen small-fry of the family, who had been waiting since six-thirty for Don Teófilo's Ciceronian effort to conclude. That dinner at Don Bimbo's was the very exemplification of the patriarchal life. Every other person at the table was either a member of the family or a member of a branch of the family, and no attempt whatsoever was made at ostentation. How I would like to take some American friends of mine who think that every Latin-American is a train robber or an assassin or a troubadour—and always a black-eyed, huge-mustachioed, olive-skinned villain, with a knife between his teeth and a six-shooter in each hand—yes, how I would like to take some of my American friends who are of that opinion and sit them down at a patriarchal table like this and let them see what Spanish family life is really like!

But even the dinner of a hungry man has its end and, as I struggled to my feet to thank them all for their kindness, someone said: "You'd better be brief, for they have a champagne supper prepared for you at the hotel—a stag party."

I replied: "Good God, who are 'they'?"

"The doctors of the town," was the answer. And I climbed laboriously into the automobile without a word, "to be *present only*," I said to myself, at the champagne supper of the medical society of La Vega.

But my medical friends, solicitous, it seems, about my nutrition, had formally appointed two of their best epicureans to see that I ate and drank sufficiently. About one o'clock in the morning the Governor, who was presiding officer for this occasion also, arose to make his second speech. But Don Teófilo was not so prolific this time as last, for a scheme had entered his fertile brain which he sprung at the close, publicly, in about these terms:

"There is an old lady in this town whom we all love, and she is absolutely penniless. She is the widow of a general of bygone days, and she is at death's door. The only person in La Vega who does not know that she cannot possibly live over two days more, is herself; and she has gotten it into her head that Dr. Ashford is going to prescribe for her and cure her. Now, since her whole family has been waiting up to see Dr. Ashford, I think we'd all better go over there right away."

I want to ask you: if, after you had had an excessively large dinner lasting from half-past nine until eleven o'clock at night, after travelling all day across the Island of Santo Domingo, and after a champagne supper in which you had been compelled to take far more champagne than was good for you, you were suddenly required to get up in your best professional manner, accompanied by the entire medical fraternity of a town, and go over and thoroughly examine and prescribe for a moribund patient who, out of politeness if for no other reason, it was incumbent on you to cure by a single stroke of the pen, as it were, what would you do?—what would you say?

I had rather liked Don Teófilo up till then, but at that particular moment I could cheerfully have killed him. I don't know what I said. But I do know that we all traipsed over there and that she lived on the outskirts of the town.

There they all were—every room lighted, and the balconies filled with people. Just then I felt like getting even with Don Teófilo, if I never did another thing in my life; and I remarked nonchalantly: "The examination of this case is going to take quite a while, so the rest can go home if they want to, but, Don Teófilo, please wait for me, because I want you to accompany me."

He promised undying loyalty, said he would remain at my side if it took twenty days.

A doctor who lived nearby loaned me microscope, stethoscope, and various other indispensable clinical instruments, and I started in. It was then two-thirty in the morning; I finished about half-past four. The case turned out to be a case of sprue, although no one in the town had guessed it. And before I left next day, I got hold of a bright young fellow and said to him:

"Now here is the plan for the treatment of Doña Jesusa. And if you want to make your everlasting reputation, you watch every breath she draws and see that this plan is not varied from *in the least*. You had better live right here. If she dies—and the chances seem to be that she will, for she has only ten per cent hemoglobin and has lost more than half her normal weight—nobody is going to blame you or any other doctor. But if she gets well, there is going to be glory enough for both of us."

And then, and only then, did I leave La Vega.

I heard no more from her doctor. But one day, about a year later, a florid fat woman waddled into my office in San Juan, and without any more to-do literally fell upon my neck. When I was able to extricate myself from this embarrassing situation, I was informed by the breathless lady that she was Doña Jesusa "of that night—you remember!"

Of course I didn't remember. When my memory was refreshed, I couldn't believe it. But there she was. There was no argument about that!

To return to my wanderings in Santo Domingo. On reaching the capital—for, by the way, Santo Domingo is never referred to as we use the term; it is La República Dominicana, while Santo Domingo is strictly the city, the capital—we found everyone occupied in preparing a huge ball for us at the casino. The president of the casino was a handsome, white-haired gentleman of exquisite culture, who had the innate dignity of the old family to which he

belonged. That evening he met us at the foot of the steps and, taking my wife on his arm, escorted her to the ballroom where the President and Mrs. Vásquez were seated.

But the crowning event of our Santo Domingan visit had taken place late that afternoon. We were told to come over to the cathedral, where we were met by the three officials holding the successive keys to the three coffins surrounding the remains of Christopher Columbus. One by one, amid absolute silence, those caskets were opened, until the battered leaden inner one was exposed with the words

GRAN ALMIRANTE

inscribed on the end.

It appeared to contain little more than dust; but in one corner I made out distinctly one of the larger vertebral bones. It seems that the coffin cannot be opened very often because, according to experts, every time the outside air and light strikes it a little more of the body is turned to dust.

2

No sooner had I returned to San Juan than I began hurried preparation for the International Congress. The preparation to which I refer, of course, was the coördination and consolidation of the immense amount of data I had been collecting for nearly two years, and the drawing of conclusions which were bound to affect very materially not only the conception but also the treatment of those cryptic anæmias of pernicious type.

From now on it was work all day and most of the night, as every whit of it had to be done personally save for, toward the end, some aid from my assistant in the labora-

tory. But no sooner had I taken pen in hand to write the body of my paper than I was again interrupted.

Very few people who do not live in the West Indies have any idea of the dread which hangs over every summer. Theoretically, the hurricane season runs from about the middle of August to the middle of September—but that is only the time when we feel the most apprehension. The fierce heat of these tropics is found in September and October; and in 1928 it was exceptionally violent. So I was not at all surprised when a hurricane travelling our way was announced on September 12. As, however, these announcements were always made when atmospheric disturbances occurred in the vicinity of Puerto Rico, I was not worried until I saw the 13th of September dawn, and then I knew we were in for it.

The ferocity of that hurricane was indescribable. In fact, a West Indian hurricane is always indescribable. I have been through several, the worst of them being the famous San Ciriaco which blew the hookworm into my life.

Now it got darker and darker, stiller and stiller, and in a trice we were off. The wind was blowing at 160 miles an hour when the instrument that registered it at the Weather Bureau was blown away. And after that the Weather Bureau itself was blown away. Rain did not descend any more. It went straight across, apparently horizontal with the earth, and along with it went trees large and small, and pieces of zinc which cut people right in two; and all of this raised such a din that the human voice was lost. My house was constructed cyclone-proof, and after that day I concluded that I would be rather a spendthrift if I took out insurance against cyclones.

All day it raged. No telephone, no lights, at length no water, and no news of the outside world. But one thing

took on a phenomenal growth that day, and that was the paper I was writing for Cairo. I can truthfully say that the best part of that paper was written to the tempo of that hurricane!

In spite of this interruption, at least the basic work in preparation had been done by the time I set sail. It is true that before sailing for Cairo I had to make a tour of the West, to speak at the Academy of Medicine of Chicago, Northwestern University, and the University of Wisconsin. These were not particularly difficult themes to work out, however, so I left them to do aboard ship. But an avenging demon seemed to pursue me, for only about two days out we were hit by a storm at sea. As far as results to my own self were concerned, this was worse than San Felipe of September 13. It was the storm in which the S.S. *Vestriss* of the Lampert and Holt Line went down. We were about the nearest vessel to her at the time, were in communication with her, and were evidently getting much more of the storm. There was no escape from manifest necessity, however, and I kept working at those papers.

To my surprise, I found that American physicians were deeply interested in tropical medicine because they hoped that, by investigation of some of our problems, light would be thrown on their own. I was charmingly received; and in San Juan, the year afterward, I had the satisfaction of entertaining some of my hosts of that western tour.

We embarked for Naples on the Italian liner *Augustus* the 24th of November, myself, my wife, and my elder daughter. And after spending a few days there and a few more in Rome, we left on the *Vienna* of the Lloyd Tries-tino Line for Alexandria.

The city of Alexandria had arranged a reception for the Delegates arriving by this boat. It was then that I met Arthur Compton, Director of Municipal Laboratories for

the city of Alexandria, with whom I have been in correspondence ever since, and who gave me much valuable information of a local character.

Shepheard's Hotel, of course, was the Mecca of the Delegates in Cairo. It was a pleasure to sit out on the wide terrace after the day's sessions were over; to gather round a little table, and, over a cup of Turkish coffee and a good cigar, exchange experiences and build up plans for future work with first one and then another of this great company of delvers after scientific truth. For there is a special chemical or physical molecular attraction between men who have been devoting themselves to research. This force brings them together in spite of themselves, and excites from them mutual confidences—confidences which are not given forth from the rostrum.

One of the men who thus became a very close friend was Dr. de Langen, a Dutch Colonial. He was my beau ideal of a worker in Medical Science in the tropics. He was physically strong—and it takes a considerable amount of physical resistance sometimes to stand the gaff. But he was above all an excellent companion. It would be a marvellous thing to work in a group with de Langen. It was he who found that a simple dye-substance would kill off *Strongyloides*, a persistent little worm which must be first cousin to the hookworm. Another delightful character was Van der Scheer. He was one of the earliest writers on sprue, having studied cases which returned from the Dutch East Indies to the Netherlands, where he practiced. A different type was found in Professor Schuffner, a white-haired, white-bearded man who was also one of the Old World practitioners, but who found time to go into some of the most abstruse questions affecting tropical medicine. He was a great philosopher, and a very kindly and amiable man.

It was a pity that more of the professors of the Italian school were not present, for their students and associates were there in goodly number. Speaking of Italians, I am always at a loss where to put Castellani. Sometimes I think he's an Italian, and at others it seems impossible that he should be anything but an Englishman. Recently he took on an American rôle; but the very last I heard of him was that he had finally been localized as the Director of the School of Tropical Medicine in Liverpool. He is one of the most charming and entertaining conversationalists I have ever met. But, while exceedingly good friends in the social world, Castellani and I instinctively reach for our hip pockets when we get on our scientific clothes.

But the soft spot I have in my heart has always been reserved for Fülleborn, whom I was overjoyed to meet again here; the master in parasitology, a tall handsome man, a Beethoven among scientists, who had travelled all over the world to gain his knowledge at first-hand. It is said that one day, while he was in the midst of a lecture before a large medical audience, Castellani slipped in and sat down, whereat Fülleborn abruptly stopped, looking fixedly at Castellani. There was not a bit of resentment in his face nor any of the premonitory symptoms of a scene, but after an unconscionable silence, Fülleborn said:

"You must ochscuse me, shentlemen, but I alvays get afraid ven I see dat Professor Castellani coming. He iss a man zat changes ze names of all ze gerins he knows, und I, being a Germ, am alvays afraid zat he vill some day try to change my name und, shentlemen, I assure you my name iss a goot name."

My particular Egyptian friend, Professor Sorour, was constantly at my side; and to him I owe a great deal of the delightful time I spent at the laboratories of the Kasr-el-Aini Hospital. Sorour was a stout man, but not too stout,

always in excellent humour, always the intense scientist, and even more the intense patriot. We had supper together several times in little taverns on the outskirts of Cairo. I went to his home and met his old father and mother. I even worked one afternoon in his laboratory, and never did one moment weigh heavily on my shoulders. Sorour was a pathologist—and he was one of the few I have known who was quite human.

As there were some 2,300 Delegates, the Congress was split up into sections. It was opened on December 15, at the Opera House, the Sub-Secretary of State for Public Health presiding. The King of Egypt occupied the Royal box and the Official Delegates were seated on the stage.

That night the King gave a magnificent dinner to the Congress, their families, and the select society of Cairo. This huge affair, fantastic in its conception, was made possible only by the vast size of the Abdine Palace, the distribution of salons, and the Oriental method of banqueting. The building was square, enclosing an enormous inner court which was a sumptuous semi-tropical garden. The King had ordered in one of his Nubian regiments composed of men selected for their height and excellent physique. Nearly all were six feet or more in stature. They formed against the wall, an unbroken line, standing at attention like statues. The only movement to distinguish them from statues was the glint from the whites of their eyes, as they followed this or that person with their glance. As a military officer I could with difficulty understand how they endured it.

Near the entrance in the centre of a little round tower room stood King Fouad on a Persian rug in the full uniform of his rank, and alone but for the Court Chamberlain. Each person or group was introduced separately, and he was very gracious, shaking hands and smiling pleasantly.

When I was introduced as the Official Delegate from the United States of America and Puerto Rico, there was a little pause. The King evidently did not speak English (I may be wrong), and he rather hesitantly addressed me in French, as if he expected that I would not understand. When he found that I did, he was delighted, and asked many questions about Puerto Rico.

He asked, also, how long I had been in the Army, and whether I had been in France during the War; and then told the Chamberlain to take my name. He seemed genuinely affable; and he certainly proved it when, of the five decorations he distributed, he gave me the Grand Cordon of the Order of the Nile. The rank which goes with this decoration, corresponding to that of Knight Commander, entitles the holder to many distinctions accorded the titled class in Egypt.

3

While the Congress was in session, I vibrated pretty steadily between the sections on Internal Medicine, and Pathology and Bacteriology, which I considered the most important. My own paper on "The Anæmias of Sprue, Their Nature and Treatment" was presented on December 18, with lantern slides and charts, and provoked intense interest and discussion, especially from the Dutch, the Germans, and Professor Castellani. There was a complete absence of carping criticism, however, and the prevailing spirit was excellent from every point of view.

It was the custom of this Congress, as of others, to elect the President of the section at the beginning of each day. The day I was elected President of the Section on Internal Medicine, December 21, happened to be the day in which papers in all five of the official languages were presented: English, French, German, Arabic, and Italian. I could

handle the Romance languages with ease, and limp along fairly well with German; but Arabic was beyond me, and one of the papers was presented in Arabic.

The speaker was a magnificent specimen of the Arab, an old gentleman, a real patriarch. He had all the fire of youth, and his mission was to do away with the abuse of narcotics in Egypt, especially hasheesh. But he overran his time. I politely called his attention to this after the first minute, but he gave me an imploring look, and I hadn't the heart to insist. He kept on and on and on, and he did not understand any language except Arabic. Finally, in despair, I called for help from a bright young Egyptian who, with enormous difficulty, blocked the flow of eloquence and allowed us to proceed. It was one of the most embarrassing moments of my life, because I did not care to have it said that we wished to depreciate either the subject or the speaker in his native land and language.

In the other section, that of Pathology and Bacteriology, I had a paper on "The Mycology of the Intestinal Canal in Puerto Rico." With two other papers, one from Egypt, and one from Greece, this happened to form a series which pretty conclusively showed that my fungus, as a pathogen, was indeed capable of producing damage to the human body. Discussed quite actively by Compton of Alexandria, the Dutch, and the Germans, nothing was offered to show that it was not a pathogen; and so it may be said that no serious challenge to either of my papers was offered at this Congress. I was Vice-President of this Section on December 19.

The closing ceremony of the Congress was held on the Island of Rodah, and was singularly and strictly Oriental. No music and no flights of oratory. It took place in one enormous Islam tent, which was raised on a perfect thicket

of gilded spars with spearheads, and was composed of Oriental tapestries sewn together. The ground was carpeted with Persian rugs. What particularly pleased the eye were the several thousand handsome green-damask-upholstered gilded armchairs for the Delegates—I occupied the lone chair for Puerto Rico—the raised dais for the officers and professors of the University, and behind them, on a higher level, the King's throne.

A semi-circular space had been left at the foot of the dais, between it and the Congress, for the introduction of those who were to receive the title of Doctor in Honoris Causa in the University of Egypt.

There were eighteen diplomas given by the University of Egypt, all of the same rank. The ceremony was a simple one. The name of the recipient was read, with his titles, and a few brief words descriptive of his activities in the science and practice of Tropical Medicine; and then the Court Chamberlain escorted the recipient to the foot of the dais, where the degree was conferred. I was fortunate enough to receive one of them, and was still more fortunate in the simple introduction which I received:

“The American prophet of Tropical Medicine.”

When such a designation comes from the lips of an Egyptian, it carries with it an overwhelming sense of responsibility.

4

Strictly speaking, up to this time I had seen very little of Cairo and, save for official excursions, I had made no effort to do what I am fond of doing in a strange place—wander idly about and try to get the life of the street and the pulse of the city. But we had made a plan, a small group of us, that, on finishing the work at the Congress, we should quietly ascend the Nile to Luxor, the ancient

city of Thebes, and sense the spirit of Egypt from the desert and the monuments of its past.

Our group was carefully selected, and included Professors Schuffner, Brumpt, Behdjet Sabit from Turkey, myself, and a few others. We boarded a sleeping car in the early evening in Cairo, the night of December 23, and I knew no more until I was awakened in the morning. It was the most curious awakening I have ever had—not an awakening due to noise, nor to anyone's touch, nor to anyone's call. I was awakened literally by a pinkness. I was thoroughly intrigued. Everything else was natural. I was in the train, right enough, and it was moving along as it had done all night. But it was that pink glow which had changed everything. And then I began to look—to look out across the tawny sand toward the beautiful green fields on either side of the Nile. It was a peaceful view. Men and animals walked slowly. The boats on the Nile drifted languidly, their big sails catching just enough breeze to give them way. But on beyond the farther bank of the river, beyond that broad band of living green and the occasional date palm, began the billowing desert, waves of sand rising higher and higher until, well in the background, they formed a chain of mountains. It was the tawny desert that was catching the first blush of dawn; catching, from the opalescent atmosphere, an iridescence which gave a vibrant momentary life to that vast symbol of death.

It was not hot, as we had been told it would be. We lost no time, but picked up a dragoman—whom we made promise not to speak unless spoken to—and made our way toward the Temple of Luxor. None of us had anticipated the immensity of the ruin, nor had we imagined the high state of its preservation. Columns had fallen; but a perfect forest of columns still stood complete to their capitals. Roof there was none, of course, but despite the fact that

all of this Egyptian architecture is heavy, massive, Luxor betrayed purpose in its relative lightness, airiness: it was the temple devoted to Life. In it remained still the conventional images of monarchs long since passed away.

But when, after proceeding up a long avenue lined by stone sphinxes, we entered the Temple of Death, the Temple of Karnak, then indeed we were speechless. Two thousand years of fire, pillage, war, earthquake, and deliberate dismantling have served only to remove the trappings of adornment, the rouge of the hour, and to leave, at the edge of the desert, the spirit of ancient Egypt, mother of civilization, nude, pathetic amidst the remnants of its tattered finery. In these days of electricity, laboratory-made science, jazz, fiery liquors, the exaltation of the subnormal and the parvenu, and the fashioning of high and low into a standard pastille of democracy where every man is free to think with the majority, Karnak's Kings still stare into infinity, waiting for the death that will not come.

The next day was in its way as inspiring as the day just past, for we made a pilgrimage to the Valley of the Kings. What we saw can be found in any description of Egypt, and, to the minutest detail, all that Carter has revealed in his magnificent discovery. So I do not propose to go over these scenes again. But I would like to chronicle the fact that my notion that the scenes and figures of Egyptian antiquity were recorded in stone in purely conventional attitudes—which is the same as saying that beauty was sacrificed for the order of things—was an error. It is true that these figures are, all of them, conventional; but I had not been prepared to see evidences of home-life, of affection, and, above all, of great reverence in what Egypt has left us.

For instance, in the tomb of a former minister of agriculture is a glorious mural representing harvest time. And at one corner of this great mural is to be found a little group

of women who are trying to pick a bit of chaff from the eye of some unfortunate. And in another tomb is a last judgment, as evident in its intention as if it were labeled. Isis is judging the world, and the world is being lugged up one by one before the goddess. She is turning the good into some desirable form—as I remember it, doves. However, I could not make out what happened to the bad ones; and I called all of my colleagues in consultation on the subject. It was the Turk, Sabit, who found the answer: two figures carrying, on a litter, down an inclined path which grew ever darker, the figure of a pig.

5

I had sent a telegram to Professor Regaud, and he was the first person I saw as the railway carriage came to a stop in Paris. It was good to see him. He had not changed at all, and he was cordial and affectionate. He said:

“Now to-night make no other engagement, for we have a reunion of our Bouleuse *popotte*. I have wired Leriche at Strassbourg, and here is his answer: ‘*Attendez-moi huit heures.*’”

Lemaitre had not answered. They told us at his office that he was out at his country place shooting. So out we went, Regaud and I, in his car.

How nice it was to sit beside the big chap again, as we spun along through the crisp air of the country! I thought of that other drive we took, not for pleasure, along the knife-edge of Chemin des Dames. I reminded Regaud. He looked pretty serious and nodded his head, but said nothing.

Lemaitre was in his hunting clothes—had just come in, in fact—and with an astonished “*Mon dieu!*” he threw both arms around my neck.

He looked extremely well. Prosperity fitted him nicely. For he was a big man now. We sat in front of the fire with a *ponche Américaine*, and in a cloud of smoke started forty stories, only to have each one interrupted with: "Do you remember this, or that?"

Then he joined us in our quest for Lescène, whom we did not find. But I was wild to see Leriche.

The banquet that night was like old times. There were about thirty of us. There had never been any boisterousness at any time at our table in Bouleuse; and now there was only intimate conversation and repartee—no roaring of songs, nor any of the antics in which veterans are supposed to indulge. This was simply a gathering of old friends who were mighty thankful to be together again. True, we had a speech from Regaud, but it was short and devoid of any hysterical exaggeration.

But nine o'clock, and no Leriche; ten o'clock and no Leriche; and it was ten-thirty before he burst in upon us, cursing the *malheureux* train, and radiating the spirit of fraternity as he alone could do.

I think we all felt something more than regret when we realized that these reunions could not often occur. I would cheerfully disarrange my life and my plans once a year, to restore the peace of my soul by a few hours with men like that.

Chapter XXV

I

THIS work must conclude with an account of how, after a whole generation, I have been recalled to my earliest problem.

There has always been an unanswered question in the history of uncinariasis. What is the true state of affairs in those curious cases of that disease which show light hook-worm infestation and yet a considerable anæmia? And in such cases, why is the percentage of those odd white blood cells—the eosinophiles—so high, not only in this but also in other parasitic affections, otherwise seemingly of small importance?

Despite both the army of workers the world over and the infinitely larger number of sick, no one has explained such cases satisfactorily; and what is worse, only where the number of parasites was large could a rapid cure be effected.

I was lying at home sick, sick of a strange pain beginning to shoot from back to extremities, one August night in 1932. In fact, I was just commencing to wonder what I would do if I were called out. Being sick was totally new to me. All of a sudden the telephone bell rang. The voice was familiar, but broken and agitated. Yes, it was Mrs. L. speaking from Caguas. Matilde has haemorrhages from typhoid fever . . . the doctors say she is dying . . . Matilde has asked for you herself . . . won't have anyone but her own doctor . . . The rest was unintelligible.

Now Matilde was a dear little soul eleven or twelve years old, whom I had treated before; and Caguas was thirty miles away. I couldn't very well say to the mother that the town of Caguas contained not the wherewithal to stop a haemorrhage from a typhoid intestine. Besides, Matilde herself had asked for her doctor. It was the least she could request, and the least for me to give. But it was midnight.

In the early morning hours I was sitting in consultation with her physician, a splendid young fellow. Clinically the case certainly looked like typhoid—three weeks' incubation after drinking unboiled water in a town where typhoid was present, profound prostration, a continuous low fever, and so forth.

He waited, but some strange inhibition came over me, and I simply could not agree. I had learned from past experience to heed those inhibitions.

"Why do you think it is not typhoid?" he ventured. "Look at those haemorrhages."

Truly, there she lay, bled white, hardly able to speak above a whisper. But there was that curious undefined something in her eyes that bespoke a determination to get well.

"I don't know myself," I replied. "Let's go over the history again."

She had gone on the 20th of June, one of a party of seven of her family, to bathe at Luquillo, a lovely little palm-rimmed beach of the sea gently sloping for two hundred yards from shore. They had bathed all the morning. Nothing had happened. In spite of a torrential rain, they had returned again in the afternoon to bathe in the same place. They noticed that in their absence a deadhead stream, or sugarcane ditch, filled with stagnant foul water, had overflowed into their inlet of the sea some distance

away. Still nothing happened, until they emerged from the water—whereupon they all began to itch furiously, and found that they were covered with bites. Some sea anemone probably, they said.

But on their return to their homes in Caguas, the itching persisted; in fact, it kept up for a week. At the end of that time Matilde and her cousin Margarita had sore throat and lost their voices; the other five simply noticed sore throat. In another week most of them had diarrhœa and a little fever. In Matilde and Margarita the diarrhœa became bloody. Later, severe intestinal hemorrhages began. Where was Margarita now? Oh, in a hospital in San Juan. And the rest? They were not very well and had become quite pale.

I browsed over this information. I rehearsed in my mind Loos's animal experiments, which I myself had repeated, and which established the following route of infestation in hookworm disease: entrance of the larvæ into the skin by boring; entrance into the veins by boring; passage on the blood current through the heart into the lung, where the larvæ were finally lodged in the finest little arteries; penetration out of the artery into the air-sacs; climbing of the bronchial tree to the windpipe, where irritation occurred; swallowing of the larvæ; their passage through the acid and inhospitable stomach; their final arrival in the upper reaches of the small intestine, where they seized upon the mucous membrane lining and began sucking away on an inexhaustible source of blood; their frequent changes of position in the midst of their sexual exaltation; the ultimate impregnation of the female and its eventual quieting down at one spot, whereafter its avidity for blood diminished and a never-ceasing stream of eggs began to dot the fæces.

"Well, doctor, this is a clear case of massive infestation

by hookworm and a grave case of acute hookworm disease," was my diagnosis—made, it is only fair to say, before any appearance of ova in the faeces, and based entirely on the history and the clinical picture before me.

I have stated that this doctor was a splendid fellow, and now he proved it.

"Look here," said I, "this case means everything to me. I'll explain later. But what I want you to do is to turn it over to me to take to our University Hospital. I can't promise, but I think we can cure her there. What's more, I want you to corral the other six victims and get them there, too."

"Certainly, Doctor Ashford, I'll help you in any way I can."

We had to transfuse Matilde to get her there alive, but we did it; and she expelled 1,448 worms full of blood. Not only this, but now for the first time in Puerto Rico I found myself looking at the worm with real teeth. This was really the St. Gotthard tunnel hookworm, *Ancylostoma duodenale*, not the New World species which I had first encountered in 1899, and which was later identified as a new species and named by Stiles *Necator americanus*. Margarita expelled 599. Both children began rapidly to improve.

But now it was that Fate rewarded me. For the other five expelled an average of only 60 worms; too few, according to the lore of those days, to cause the symptoms they had—that is, a marked anæmia and the most fantastic blood picture I had ever seen—a picture containing from 60 to 90% of a white cell whose upper normal limit was 4%.

In other words, all seven had received the same dose of infestation. But in five the vast majority of the larvæ had lost their way. They had never got into an air-sac;

they were wandering God only knows where in the body of their host. When they died, they split up into curious chemical radicals which produced anæmia and that remarkable blood picture.

Ten hours a day for six weeks were spent counting the blood and taking scientific data in those seven cases, and thereafter five hours a day for a year.

And so from my sickbed I have been able to write the final story of hookworm in Puerto Rico, and to publish it in our scientific journals. I have been able to show, after thirty years, that my uncorroborated claim that *acute fatal hookworm disease* is a possibility was not made without reason in the Report of the Porto Rico Anemia Commission in 1904.

But of vastly greater importance is the demonstration, now complete, that we can no longer judge of the seriousness of a case solely from the number of eggs found per gramme in the fæces. There is a *larval phase of uncinariasis* incapable of cure by intestinal vermifuges or vermicides.

And of this new phase of an old disease, stumbled upon as it were overnight, victims are undoubtedly suffering throughout the hookworm belt, with few if any eggs in the intestinal contents—the microscopic examination of which provides practically the only evidence of the disease sought. Even to-day, though all seven of my patients show a great improvement, with marked increase in weight and in blood values—especially in the cases of Matilde and Margarita—*none* of them is entirely well. For all of them, even the two who expelled such great numbers of intestinal worms, are suffering from this newly discovered *larval phase of uncinariasis*. Their anæmia and distorted blood picture obstinately persist. For them, and for all their fellow sufferers, science has yet to devise a cure.

2

So at the end we see clearly the relation of clinical to scientific medicine. One can no longer exist without the other. The best scientists in medicine are, or should be, clinicians. All of the work on hookworm disease in Puerto Rico has been done this way. From the patient has come the problem. From science has come the solution. The two are inseparable.

Even among the ignorant denizens of the coffee grove, who could neither read nor write, there developed a keen appreciation of the effort being made to obtain data for the establishment of principles which should guide all people in the future. There was no longer any necromancy about medicine. It was serious, hard work, and they helped us in every way they could, being present at unearthly hours for the taking of blood, the examination of urine, and the many other little chores connected with a full history of the case. And little by little we gained the entire confidence of our patient.

These principles guided us in the study of sprue, in the study of that queer picture of nutritional unbalance throughout the Island; and they are to guide us, as far as Puerto Rico is concerned, in the reclaiming of these tropics by restoring health lost from whatever cause.

I suppose that every physician has his pet class of cases; and I myself, at the end of this long argosy, have reached the point of thoroughly enjoying the application of the knowledge I have gained from a clinical and laboratory study of sprue.

Although very ill, I find that the best remedy for my pain comes from a study of my sprue patients. Therefore, I have had my back office and private laboratory converted, temporarily, into a reception room for such cases.

And thither, recently, there was carried, in the arms of his son, a dear old man from the very heart of the country. He was almost moribund. With his raw tongue, belly filled with gas, twenty to thirty evacuations of the bowels a day, and above all an emaciation well-nigh fantastic, it was among the worst cases of sprue I had ever seen. To accentuate his condition, the terrible pernicious form of anæmia had supervened, leaving him as white as a ghost. Sprue was veritably dissecting its victim in this quavering old man.

Now it so happened that a little over a month hence the Pan-American Medical Association was to spend a day with us at the School of Tropical Medicine. They had chartered the Trans-Atlantic Steamship *Pennsylvania*, to make a tournée of the principal ports of tropical America, save for those south of Venezuela. Our fraternal invitation was made official by that of our Insular Legislature, which had appropriated some three thousand dollars for their entertainment. They would number over a thousand, six hundred of them physicians. As a member of the Faculty, I was asked by our Director, Dr. George Bachman, to address them on sprue and uncinariasis; but I felt able to accept only the first of the two subjects. As time went by, however, it began to look as though my condition would not permit me to speak on even one.

But as soon as my eyes fell on this case, I realized that the matter was settled for me. I would attempt at least the partial cure, and show the result to the Association. Nothing less than the constant observations of several thousand cases could have prepared me to carry this poor old man, without a single false step and in the briefest possible time, to his practical cure; but I must confess that I myself was astounded at the result.

The old gentleman was a typical product of the soil, and

bore all of the stigmata of one of the principal factors in the causation of the disease: a life-long food habit constituting a nutritional unbalance, and consisting of rice, beans, codfish and tubers all liberally overlaid with grease and sugar. At present, the state of his blood was only fifteen per cent of the normal; and this condition was momentarily threatening his life.

I said to him: "How old are you?" Immediately there was a tremendous sensation. An argument began, in which every member of the family took part. Knowing how ages are calculated in the country, and seeing the hopelessness of trying to use modern methods, I held up my hand, stopped the discussion and asked him: "Do you remember the cyclone of San Ciriaco?"

"Why, of course; I was full of children at that age, some of them grown up."

Then I looked steadily at him for some time, and pressed my questions further: "Think now! Do you remember the cyclone of San Narciso?"

This time the rest of the family *did* keep quiet; but his eyes kindled, and he proceeded to give me a very clear picture of that event. He was then an active boy—milked a cow, picked coffee. This fixed his age at not less than seventy-seven.

After a searching examination, including his blood, I made my plan. He was to go to our University Hospital, just behind the School, where I was to visit him and make daily blood examinations to get his normal oscillations, and where other laboratory examinations such as blood chemistry, basal metabolism and examination of gastric juices were to be performed. Then, after a week, I could send him home, with diet and medicines well learned, and with instructions to return the afternoon before the Congress and stay overnight at the hospital.

"Do you still want to live?" I asked him.

"Why, of course," he replied, "as long as I can."

"That's the spirit," quoth I. "Then you're willing, are you, to let me try to cure you, and exhibit you to a congress of some thousand doctors from all the Americas, about the 26th of March?"

I didn't wait for him to answer, but added: "Think, though, of what I'm going to say to you, before you answer. I'm going to make a great effort, perhaps the greatest of my life, to cure you; and you will owe me in return for it only one thing: that you will keep your word to me as one Puerto Rican to another. I am now going to send you to our hospital for about a week. Then I will send you home [he lived at the other end of the Island]; and precisely on the 25th of March, the day before the Congress, you are to report to me here at my home, well-dressed, and ready to go with me onto the platform, that I may exhibit you as a well man."

"Why," he gasped, "that will be only a month and two or three days—and look at me now! I'm sure I won't be able to do it."

"Don't bother about what you can or cannot do, old man; but come back to me on the 25th of March and you'll see. Promise?"

He held out a skinny hand, cold and trembling. The look in those grey eyes settled it, however. He had given me his word, this time; and I would have banked my life on it.

For a week I made a daily visit to that hospital to see my old man, taking home his blood to count and study it, and ordering every known laboratory examination, in order to clear up the diagnosis of sprue without question or quibble. Then I let him go, wonderfully improved, but still a very sick man.

The Director of the School knew nothing of all this. As the day of the Congress drew near, he said rather mournfully: "I suppose that you will have to be left out of the programme; but you have an awfully fine man linked with you [Dr. Ramón Suárez], and he can prepare something."

I replied that he would not have to prepare anything; and then I told him about my dicker with my old man. Everyone smiled, save the Director. Some even hooted. The very idea of depending on such notoriously unreliable elements . . . !

But I prepared my side of the case from records kept here; and the day before the Congress, there walked into my office at home a man whom at first I frankly did not recognize—a spry man, with good colour and with a grin to satisfy anyone. In a few minutes I was examining his blood for the last time. I found it exactly five times higher than it had been when first he had come to see me; and all of his symptoms had disappeared. . . .

The next day, with considerable difficulty on my part, I got into my machine and was driven to the assembly hall of the Congress on the top of a high knoll. There I was met on the sidewalk by a wheel-chair; but no wheel-chair that I have yet seen can climb those stairs. We had arrived somewhat late; everyone was in his place; and so, when it came to getting up a hundred stone steps to the hall, there was but one solution: the chair with the sick doctor in it had to be carried up on the level, and this was done by my son and my seventy-seven-year-old exhibit, one on either side. My ex-anæmia patient never showed fatigue. He stood quietly beside my chair, while I made my four-minute presentation of his case from the platform. I have given these details for the benefit of those who believe that there are no just compensations in the practice of medicine among the poor.

The doctor's mission from this time forward, as I see it, is not so much a question of relief of pain, or of prevention of death, as it is a question of salvaging this man, this woman, this child for one hundred per cent efficiency in the future. There must be a thousand ways of doing it. But this story tells how I have tried to do it, not only on this Island and elsewhere in these Indies, but also on the American battlefields of Europe, in the highlands of Brazil, and wherever the fortunes of this ceaseless war against disease have carried me.

AUTHOR'S NOTE

Author's Note

THE West Indies were the real gateway between Europe and the New World. This is a fact, historical as well as geographical, which must often be irritating to those who habitually think of our earliest occupation of America in terms of Plymouth Rock.

Thirty-six years ago, by the fortunes of war, the writer was thrown into this portal between the Old World and the New. Here, along with an army of others, he has been striving through nearly four decades to make of these Islands a new highway of knowledge: one destined to unite the two great continents of this hemisphere.

Now, for the first time, do I return in spirit to my own people, to render an account of those thirty-six years.

Those years have been for some time on my conscience, however. It was my duty to write of what I had experienced and of the people whom I had met and known, before the fine lines of memory should fade. For every man or woman who has had the good fortune to stumble upon new and helpful truths, to take part in great events, to gain contact with men and women who have done great things and inspired great thoughts, is in honour bound to write of what he has seen and learned. But constant labour, steady plodding through daily duties, never permitted me the time, until a long illness put at least a temporary halt to them. And then there was little that I could do physically, actively, except read over the fifteen large scrapbooks in which I had meticulously stored the record of all these things. I should have to dictate.

I needed a collaborator, one who could not only commit to paper what I should say, but who would also plan with me this book, arrange its contents, and stimulate and encourage its accomplishment. Fortunately, such a person came to me; a writer and critic, a devoted friend of ours for these many years, who knew the tropics well, valued them, and had been a witness of much that is chronicled here: Elizabeth Kneipple Van Deusen. Through Mrs. Van Deusen's untiring and invaluable coöperation, this book has been planned, drafted, written, and despatched to the publishers after six crowded tropical months of ceaseless labour from July, on through the hurricane season, to January first, when the manuscript was mailed to the States.

Without the devoted care and encouragement of my wife, my own work in the tropics could not have been accomplished. I well remember the first time—thirty-five years ago, shortly after our marriage—when she stood at my side to help me with the tedious task of counting the blood of the anæmics who poured into Ponce after the hurricane of 1899. She has been at my side ever since; and her loyalty and helpfulness are unfaltering.

For the advice and encouragement of Muna Lee, well-known writer and critic, I owe a debt of gratitude also.

Finally, to the present Surgeon-General of the Army, Major General Robert U. Patterson, a contemporary colleague and intimate friend of Army days, and to Major General Merritte W. Ireland, not only my war Chief in France but also the man whose authority in Washington largely made possible the hookworm and sprue campaigns, I am indebted for a careful critical reading of the text.

BAILEY K. ASHFORD

*San Juan, Puerto Rico
March 30, 1934*

INDEX

Index

Abreu, Mme., 329, 330, 344
"Addison's Disease," 374-375, 376, 377, 379
Adjuntas, 62, 91
Agnew, 7
Agramonte, Dr. Aristides, 346, 347
Aguerrevere, 52
Aibonito, 68, 69, 70, 71, 72, 75
Alabama, 111, 298
Alhambra, 36, 124
American Medicine, 53
Amiens, 255, 257, 259, 294
Ancylostomum duodenale, 4, 5, 46, 47, 95, 407
Anæmia, 3, 4, 5, 41, 42, 43, 46, 47, 49, 52, 53, 56, 77, 78, 81, 83, 85, 87, 89, 91, 99, 105, 110, 121, 132, 133, 135, 141, 333, 334, 339, 371, 374, 375, 376, 378, 379, 380, 383, 404, 410
Anæmia Dispensary Service, 100
Antietam, 6
Antigua, 181
Arras, 229, 230, 273
Ashford, Bailey K., early youth, 6-8; ancestry, 8-10; religious background, 10-11; education, 11-18; in the Army, 20-22; war with Spain, 22-27; marriage, 27, 30-31; honeymoon, 32; on duty, 35-39; field work, 41-45; illness, 48; Anæmia Camp, 54-61; success, 61-63, 67, 68; growth of clinic, 68-70; in Aibonito, 70-80; continued success, 80-86; enlargement of medical service, 86-89; results, 90-92; in the U. S., 93-96; new clinic, 100-104; rejoins Army, 105; promoted, 107-108; plans, 110-111; in Mississippi, 112-115; return to Puerto Rico, 115-118; in Europe, 118-124; more of Puerto Rico, 125-127; further research, 129-139; to Brazil, 140-150; activity, 151-165; through Brazil, 166-177; in Barbados, 179; St. Thomas, 180-190; France, 193-208; transferred, 209-211; at the front, 211-272; decorated, 272; with the French, 274-292; problems, 293-308; fighting, 309-315; promotion, 317; return, 318-324; back to the tropics, 326-342; U.F.C. conference, 343-354; at the Institute, 355-364; at the School, 365-372; research, 373-381; in Santo Domingo, 382-391; to Cairo, 393-402; reunion, 402-404; final results, 405-414
Ashford, Mrs., 32, 42, 45
Ashford, Gloria Maria, 115, 383
Ashford, Mahlon, 115, 344, 347
Ashford, Margarita, 115
Avignon, 122
Babinski, Professor, 319
Baccarat, 298, 301, 302, 305, 306
Bach, 159
Bahía, 146
Bailey, Lieutenant Howard, 112
Bailly, Mme., 214, 215, 315, 317
Banting, Dr. F. G., 344
Barbados, 178, 179
Barcelona, 117, 122
Bass, Dr. Charles C., 346
Beethoven, 14
Belgium, 93, 239, 240
Bell, Dr. Alexander Graham, 323
Belleau Wood, 306

INDEX

Bello Horizonte, 153, 165, 168, 172, 173, 174, 175
 Berlin, 293
 Berlin, University of, 140
 Bethune, 216, 221, 222, 225, 231, 235, 259
 Bond, Colonel Paul, 213, 214, 295, 296, 317
 Borden, Major William, 108
 Bouleuse, 229, 233, 235, 237, 244, 245, 246, 274, 279, 286, 287, 289, 290, 402
 Boulogne, 267, 269, 272
 Brazil, 140, 141, 146, 148, 150, 151, 155, 156, 157, 160, 172, 174, 175, 414
 Bruns, Hayo, 120
 Brussels, 119, 123
 Buchanan, President, 9
 Buenos Aires, 143, 144
 Burgogne, Duc de, 210
 Burnett, Major, 295, 298, 302
 Burtschaell, Major General C. H., 222, 223, 269
 Caguas, 404, 405
 Calvin, John, 10
 Canada, 182
 Canino, Dr., 76
 Capella Nova, 166, 168, 169, 170, 171, 172, 173, 175, 176, 177
 Capitol, 105, 363
 Caribbean, 3, 5, 35, 69, 80, 188, 344, 362
 Carroll, James, 109, 110
 Carte, Dr. H. R., 346
 Castellani, Aldo, 135, 334, 344, 346, 351, 395, 397
 Castle, Dr. William B., 378, 379
 Cervera, 23
 Chagas, Carlos, 140, 153, 154, 155, 170
 Château-Thierry, 275, 283, 288, 306
 Civil War, 111
 Cologne, 122
 Columbia University, 355, 358, 359, 360, 361
 Columbus, 28, 41, 163, 180, 384, 387, 391
 Córdoba, 124, 131
 Couto, Dr. Graça, 158
 Cowell, Captain, 262, 272
 Crozier, General, 20
 Cruz, Oswaldo, 140, 152, 153
 Cuba, 22, 23, 48, 180, 326, 327, 328, 384
 Cultin, Colonel, 202
 Dante, 123
 d'Arc, Jeanne, 205, 255
 Dawson, Sir Bertrand, 272
 Degetau, Don Federico, 70
 Denmark, 181, 182
 Donrémy, 205, 209, 319
 Duval, 244
 Edwards, General, 309
 England, 181, 222, 223
 Epernay, 233, 234
 Ferrell, Dr. John, 139, 143, 151
 Foch, General, 306
 Fontainebleau, 200
 France, 21, 93, 181, 194, 195, 196, 200, 205, 210, 238, 240, 253, 261, 275, 289, 299, 314, 323, 329, 397
 Frederick the Great, 31
 Füleborn, Dr. Frederick, 345, 346, 348, 349, 395
 Garfield, President, 7
 Geneva, 122
 George Washington University, 13, 15
 Georgetown University, 7, 15, 94
 Gerardmer Sector, 298, 299, 300, 305
 Germany, 93, 275
 Gibraltar, 123, 124
 Gondrecourt, 200, 201, 205, 206, 207, 208
 Goodman, Dr. A. L., 355
 Gorgas, General, 194
 Goubeau, General, 202
 Granada, 123, 124
 Grant, General, 109, 110
 Grant III, Ulysses, 108

Gray, Dr., 94
 Guiteras, Dr. Juan, 326, 327

Haig, General, 259
 Haiti, 180
 Haldane, 120
 Hartsock, Major, 196
 Harvard University, 378
 Hassall, Albert, 46, 47, 95
 Hattiesburg, 112, 113
 Havana, 326, 327, 328, 329, 344
 Heidelberg, 122
 Hillary, William, 178
 Hindenburg, 29
 Hoft, Colonel John Van Rensselaer, 29, 30, 31
 Holland, 181, 369
 Holmes, Colonel Gordon, 263
 Hookworm, 76, 77, 78, 79, 80, 85, 87, 94, 95, 100, 101, 103-104, 120, 132, 142, 172, 340, 348, 392, 406, 407, 408, 409
 Howze, Major Robert, 51, 116
 Igaravídez, Pedro Gutiérrez, 55, 73, 82, 84, 86, 87, 88, 96, 100, 104, 359
 India, 44
 Ingersoll, Robert, 10
 Inquisition, 86
 International Health Commission, 98, 139
 Ireland, General, 310, 315
 Iturbe, Dr. Juan, 346, 349
 Jackson, General, 20
 Jonchery, 238, 239
 Juizda Fora, 165, 166
 Kean, Colonel Jefferson Randolph, 125, 126, 310
 Keller, Lieutenant Colonel W. L., 233
 King, Walter W., 51, 52, 53, 54, 73, 74, 82, 84, 100, 104
 Kober, George M., 16
 Lafayette, 200
 Lamarché, Monseigneur, 383, 384, 385, 386
 Langfitt, Major, 108, 109
 Langres, 207, 210, 213, 214, 215, 216, 221, 274, 294, 295, 296, 302, 305, 315, 316
 Lares, 72, 82
La Vie Parisienne, 266
 Laznet, General, 283, 285, 287
 Lemaitre, 229, 236, 237, 238, 239, 240, 241, 243, 244, 290, 346, 402
 León, Juan Ponce de, 117
 Lepine, Dr. Pierre R., 345-346, 349
 Leriche, 244, 290, 346, 402, 403
 Liggett, Hunter, 21, 22
 López, Don Ramón B., 117
 Lutz, Adolfo, 141, 150, 153, 173, 176
 Lyons, 122, 237, 290
 MacPhail, Dr. N. P., 346, 352
 Madrid, 122, 123
 Magalhães, 157
 Malvoz, 120
 Manson, 4, 135, 355
 Martínez, Dr. I. González, 82, 100, 104, 359, 372
 Martinique, 182
 Marne, 233, 240, 306
 Mathilde, 404, 405, 406, 407, 408
 Mayagüez, 25, 26, 27, 28, 32, 372
 McAndrews, General, 207, 209
 McNee, Major, 266, 267
Medical Journal, 45, 46, 47, 93
 Metz, 202, 203, 258, 310
 Mexico, 20
 Miles, General Nelson A., 22, 24
 Minas Geraes, 151, 165, 168, 174, 175
 Minot, George C., 376, 377
 Mississippi, 111, 112, 113, 114, 115
 Moeller, Dr., 122, 355
Monilia, 136, 137, 138, 195, 331, 332, 333, 334, 335, 336, 337, 342
 Mons, 239
 Monserrat, 123
 Mount Vernon, 17
 Myles, Colonel, 269, 270, 271, 272
 Nancy, 203
 Naples, 84, 100, 393

Napoleon, 44, 119
 Newsholme, Sir Arthur, 345, 352, 353, 354
 New York, 28
 Noguchi, Dr. Hideyo, 344, 347
 Northcliffe, Lord, 259

Oidium albicans, 135, 136
 O'Reilly, General, 22-23, 105, 112
 Oriente, 327, 328
 Oswaldo Cruz Institute, 140, 150, 152, 154, 169

Page, Ambassador Walter Hines, 95
 Page, Henry, 18, 20
 Pappenheimer, Dr. Alwin, 358, 359, 360
 Paré, Ambroise, 27, 243
 Paris, 119, 200, 233, 237, 255, 256, 257, 275, 278, 290, 306, 318, 319, 320, 323, 402
 Passchendaele, 224
 Pasteur, 319, 320
 Pearce, Dr. Richard, 139, 143, 151
 Pennsylvania, University of, 139
 Pérez, Don Juan, 74
 Pericles, 14
 Pershing, General, 200
 Pétain, General, 208
 Philip I, 52
 Philippines, 48
 Poincaré, President, 208
 Policard, 245, 246, 346
 Ponce, 5, 24, 32, 33, 38, 39, 40, 45, 51, 52, 69, 87, 327
 Pont-à-Mousson, 202, 203, 204
 Porter, Colonel, 193, 196, 197, 198, 208, 295, 310
 Porto Rico Anæmia Commission, 56, 69, 70, 75, 76, 79, 82, 84, 88, 96, 98, 99, 120, 125, 132, 348, 363-364, 372, 408
 Portuguese River, 39
 Potomac, 17
 Puerto Rico, 4, 22, 23, 30, 38, 43, 46, 47, 48, 49, 51, 54, 63, 67, 69, 70, 76, 78, 79, 85, 87, 89, 91, 92, 93, 95, 96, 97, 98, 104, 105, 110, 111, 119, 121, 135, 141, 142, 145, 146, 148, 155, 160, 181, 182, 183, 194, 195, 320, 326, 333, 335, 337, 339, 340, 341, 348, 349, 360, 361, 364, 371, 372, 373, 374, 375, 379, 382, 392, 397, 399, 407, 408, 409

Puerto Rico Ilustrado, 103
 Puerto Rico, University of, 355, 358, 361
 Purvis, 111, 112, 113

Reed, Walter, 17, 18, 47, 48, 369
 Regaud, M., 281, 284, 287, 290, 346, 402, 403
 Reims, 248, 255, 275, 279, 287, 288, 289, 292, 294, 346
 Relief, 24, 28
 Rhine, 122
 Richet, Charles, 247, 282, 283, 292
 Río de Janeiro, 140, 141, 144, 150, 154, 156, 157, 159, 160, 162, 165, 178
 Rivera, Luis Muñoz, 103
 Rockefeller, John D., 95, 96, 139, 151, 152, 175
 Rockefeller Foundation, 79, 98, 104, 140, 151, 152, 177, 344, 348, 358
 Rockefeller Sanitary Commission, 96, 98
 Roosevelt, Theodore, 114
 Rose, Dr. Wickliffe, 96, 97, 98, 139, 177
 Ross, Colonel, 224, 225
 Roux, Emile, 320

Saint Saëns, 255
 Saldaña, Dr., 117
 San Ciriaco, 5, 36, 37, 86, 392, 411
 San Cristóbal, 115
 San Juan, 5, 37, 52, 55, 62, 70, 73, 87, 91, 115, 116, 118, 133, 342, 355, 358, 361, 363, 390, 391, 393, 406
 San Salvador, 180
 Santiago, 23
 Santa Domingo, 180, 382, 383, 387, 389, 390
 Seidl, Dr. Carlos, 150, 152, 160

Sein, Dr. Francisco, 72, 82
 Seville, 124
 Sibert, General, 193, 194, 196, 197, 199, 200
 Soissons, 274, 283, 286, 294
 Sousa, John Philip, 13
 South America, 139, 140, 154, 156, 165, 177, 181
 Spain, 19, 20, 28, 35, 122, 123, 124, 125, 180, 181, 386
 St. Gotthard, 4, 93, 407
 St. Nazaire, 199, 200
 St. Thomas, 180, 182, 185, 187
 Stahl, Agustín, 54, 55
 Stiles, Dr. C. W., 46, 47, 93, 94, 95, 96, 407
 Strong, Lieutenant Colonel Richardson, 266, 267, 341
 Switzerland, 4
 Taft, William Howard, 114
 Tanon, Professor, 278
 Teach, Edward, 188
Tenadores, 194, 197
 Tennessee, 113
 Tennessee, University of, 96
 Terni, Professor, 122
 Thompson, Major General H. M., 216, 231, 262, 267
Times, 120
 Tissier, 245
 Torres, Dr., 147, 148
 Toul, 298, 301, 302, 303, 305, 309
 Tricoche Hospital, 52
 Trinidad, 181
 Tropical and Transmissible Diseases, Bureau of, 86, 87, 88
 Tropical Medicine and Hygiene, Institute of, 99, 100, 103, 104, 110, 131, 132, 185, 325, 340, 341, 342, 343, 355, 358, 359, 364
 Tulane University, 6, 7
 Utuado, 56, 57, 61, 62, 68, 72, 74, 94, 99, 100, 101, 102, 120, 341
 Vasconcellos, Dr., 150
 Vianna, 140, 148
 Vincent, Dr. George E., 344
 Vogel, Dr. Carl, 355
 Washington, D. C., 8, 9, 11, 43, 51, 84, 94, 109, 110, 111, 112, 113, 139, 195, 214, 311, 318, 323, 324, 325
 Washington, George, 10, 16, 117
 West Indies, 131, 189, 392
 Westphalia, 121
 West Point, 108
 White House, 105
 Winkle, Rip Van, 92
 Winthrop, Governor Beekman, 111
 Wood, Leonard, 17
 Wright, Sir Almoth, 272
 Yellow fever, 48, 140, 194, 326
 Ypres, 224
 Zuñiga, Dr., 350, 351

continued from other flap)

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